

## METHODS FOR IMPROVING THE PERFORMANCE OF FABRIC WRINKLE CONTROL COMPOSITIONS

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**CROSS REFERENCE TO RELATED APPLICATION**

25 This application claims the benefit of U.S. Provisional Application No. 60/230,859, filed  
on September 7, 2000.

## TECHNICAL FIELD

30 The present invention relates to methods for improving the performance of compositions comprising waster and optional ingredients for removing wrinkles from fabrics, the compositions being packaged with a dispenser as an article intended for distributing said compositions. Said methods accomplish several purposes including the teaching of information that is critical to improving product performance and its acceptance. The methods are also related to the extension of the useful life of clothing items when treated with such compositions. The methods also encompass techniques to mass market compositions in ways that heighten the awareness of such products both with traditional and non-traditional

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consumers via traditional and non-traditional marketing approaches and by distributing products through non-traditional channels to make them readily available to all consumers.

### **BACKGROUND OF THE INVENTION**

5 The wrinkle control compositions that can benefit from the methods of the present invention are those compositions that enable the consumer to remove or control wrinkles in their fabrics without the application of heat to cure or otherwise activate the composition. Several such wrinkle control products are currently available in the market.

10 In general, these products are niche or specialty products that are used by consumers primarily when traveling. For instance, the Wrinkle Free product available from Very Impressive Products, Inc. is a good example of this principal. It is highly priced with limited marketing and distribution. It is stocked at American Automobile Association (AAA) Travel Agency Stores and is given only limited retail shelving. Other wrinkle control products, such as Wrinkle Out™, are also difficult to locate even in traditional distribution channels. These 15 products have not moved beyond the status of niche products and clearly do not enjoy the status of a product that is kept close at hand and is used in everyday life in the manner of a body deodorant, laundry detergent, fabric softener, or toilet paper.

20 Other wrinkle control products have also failed to establish successful large markets. Amongst these are the ATO Care spray (manufactured by Lion, Japan), Wrinkle Out™, manufactured by Emson®, Wrinkle Free®, manufactured by Very Incredible Products, Inc.© and Faultless® Wrinkle Manufactured by Bon Ami Co. Likewise, these products are also viewed as niche products by the consumer.

25 Most consumers are familiar with using a heated iron, ironing aids, steamers and various processes that require the application of heat to remove and control wrinkles from their fabrics. However, the typical consumer lacks even a general understanding of how to use a wrinkle control composition that does not require the application of heat, and thus, they do not have confidence in the ability of such a composition to effectively remove or control wrinkles.

30 Existing wrinkle control products typically have engaged in minimal advertising with no in depth advertising dedicated to educating the consumer. To be successful, the consumer needs to be educated regarding the proper use of the product, the product's effectiveness, the appearance of the fabric in the finished state, how the product might be incorporated into the consumer's everyday habits and lifestyles, the additional non-wrinkle benefits that may be achieved with the product and how the product may be effectively and safely used by most 35 members of the consumer's household.

Therefore, there is a need for various methods for improving the performance of a wrinkle control product by exposing consumers to non-traditional advertisement programs that are geared towards teaching the consumer proper use of the product, how to incorporate the product into their daily lives, the variety of product uses and benefits, and to set appropriate expectations for the product's performance. Without the dissemination of such information, the consumer will never experience the full potential of these compositions.

### SUMMARY OF THE INVENTION

The present invention provides methods for improving the performance of a consumer wrinkle control composition by making the composition available to the consumer and providing information to the consumer concerning the use of the composition to control wrinkles in fabrics without the application of heat. The compositions useful in the present invention are essentially water together with optional ingredients such as perfume, starch and others. The compositions are preferably stable, well dispersed, more preferably translucent, and even more preferably clear. Information may be provided by teaching educational elements and disseminating educational elements to consumers in an efficient, effective, and affordable manner as well as techniques for heightening consumer awareness of the product. The information that is provided to the consumer concerns the use of the composition to remove or control wrinkles in fabrics without the application of heat. In addition, the information can include instructions for the proper use of the product, the product's effectiveness, the appearance of the fabric in the finished state after treatment, instructions on how the product can be incorporated into the consumer's everyday habits and lifestyles, the additional non-wrinkle benefits that may be achieved with the product and how the composition can be effectively and safely used by most members of the consumer's household.

The present invention also relates to methods for improving the performance of wrinkle control compositions that are incorporated into containers having a spray dispenser to create an article of manufacture that can facilitate treatment of fabrics and/or fabric surfaces with said compositions containing wrinkle control agent and other optional ingredients at a level that is effective, yet is not discernible when dried on the surfaces. The spray dispenser comprises a manually activated as well as non-manual or power operated spray dispenser and a container for the wrinkle controlling composition.

The present invention further provides methods for improving the consumer's acceptance of a spray wrinkle control composition for use in controlling wrinkles without the application of heat. The method comprises the steps of providing a wrinkle control composition to the consumer and providing information to the consumer concerning the use

of the composition to control wrinkles in fabric without the application of heat to the fabric. The information to be provided in conjunction with the composition concerns the proper use of the product, the product's effectiveness, the appearance of the fabric in the finished state after treatment, instructions on how the product can be incorporated into the consumer's everyday habits and lifestyles, additional non-wrinkle benefits that may be achieved with through the use of the composition and how the composition can be effectively and safely used by most members of the consumer's household.

In yet another process aspect of the present invention, methods are provided for prolonging or extending the useful life of fabric items that require frequent and repeated laundering processes that are prone to cause incremental damage to fabric fibers. These methods prolong the useful life of such fabric items by enabling the item to be revitalized or renewed for rewear without laundering, thus reducing the number of launderings and the resulting damage to fabric fibers over a given period of time. These methods comprise the steps of providing the composition and providing information to the consumer regarding the proper use of the composition independent and apart from a laundering process.

#### **DETAILED DESCRIPTION OF THE INVENTION**

Each of the methods of the present invention comprise the steps of providing a consumer fabric wrinkle control composition that can provide wrinkle control in fabrics without the application of heat to cure or otherwise activate the wrinkle controlling effect and by providing information concerning the use of such a composition to control wrinkles. As described hereinafter, a variety of wrinkle control compositions may be used to advantage in the methods of the present invention. Likewise, a variety of information may be provided in conjunction with such compositions to improve the performance of those compositions, to improve the consumer acceptance of those compositions and to prolong the useful life of a fabric article on which the compositions can be used.

#### **I. PROVIDING A WRINKLE CONTROL COMPOSITION**

A variety of wrinkle control compositions may be used to advantage in the methods of the present invention. Wrinkle control compositions must however, be capable of removing wrinkles from fabrics without the application of heat to cure or otherwise activate the wrinkle controlling effect of the composition. Such compositions are described in more detail in U.S. Patent Nos. 3,674,688, 4,661,268, 4,806,254, 5,062,971, 5,100,566, 5,532,023, 5,573,695, 5,798,107, 5,965,517, 5,968,404, and 5,997,759. Likewise, such compositions are the subject of and are described in additional detail in U.S.S.N. 09/067,385, filed April 27, 1998, Trinh et al.; U.S.S.N. 09/067,241, filed April 27, 1998, Trinh et al.; U.S.S.N. 09/208,215, filed December 9, 1998, Trinh et al.; U.S.S.N. 09/457,847, filed December 9, 1999, Trinh et al.; U.S.S.N. 09/503,525, filed February 13, 2000, Frankenbach et al.; and

U.S.S.N. 60/182,381, filed August 9, 2000, Frankenbach et al. entitled "Polymer Compositions having specified pH for improved dispensing stability of wrinkle reducing composition and methods of use."

Specifically, wrinkle control compositions useful in the methods of the present invention include:

- (A). A composition comprising fluid carrier, preferably water. Water provides a surprising degree of wrinkle prevention. The compositions useful in the present invention typically contains at least about 30% and less than 100% by weight of the composition of water. Water suitable for the present composition can come from many sources. It is preferable, but not essential for the water to be distilled and/or deionized.
- (B). Optionally, an effective amount of wrinkle control agent selected from the group of silicones, fiber-fabric lubricants, shape retention polymers, lithium salts, perfumes, fabric care polysaccharides, and mixtures thereof. When wrinkle control agent is included it is typically included at levels of at least about 0.001% and typically less than about 10%.
- (C). Optionally, to reduce surface tension, improve spreading, penetration, and formulatability, an effective amount of surfactant.
- (D). Optionally, to plasticize fibers and shape-retention polymer plus provide additional benefits such as increasing antimicrobial efficacy, reducing surface tension of, and aiding in perfume formulation and delivery, an effective amount the composition of hydrophilic plasticizer and/or solvent.
- (E). Optionally, an effective amount to absorb malodor of an odor control agent.
- (F). Optionally, but preferably, an effective amount to provide olfactory effects of perfume.
- (G). Optionally, an effective amount, to kill, or reduce the growth of microbes, of antimicrobial active.
- (H). Optionally, a effective level of propellant.
- (I). Optionally, other ingredients including water-soluble polyionic, anti-static agents, insect and/or moth repelling agent, colorants, anti-clogging agents, and, viscosity control agents.
- (J). Optionally, mixtures of optional ingredients (B) through (I).

The present invention also relates to concentrated compositions, which are diluted to form compositions with the usage concentrations, as given hereinabove, for use in the "usage conditions".

**A. FLUID CARRIER**

Wrinkle control compositions disclosed herein comprise a fluid carrier and the preferred fluid carrier is water. Surprisingly, water alone is capable of plasticizing fibers such that a sufficient degree of wrinkle removal and/or reduction can be attained by spraying water onto a surface and gently pulling or smoothing the garment to release wrinkles. Water is also inexpensive, environmentally sound, non-flammable and easily disposed.

Although water alone is sufficient to remove wrinkles, the compositions preferably comprise optional ingredients such as perfume, surfactant, water-miscible solvents, shape retention polymers, anti-microbial, and odor control agents, as well as other optional ingredients. The optional ingredients aid in improving the efficacy of water, increasing wrinkle control performance of the product, delivering aesthetics, and contributing other desirable attributes as disclosed herein below.

Water with or without dissolved minerals and impurities is suitable for the present invention, e.g. de-ionized, distilled, or tap water, but purified water is preferred. The present invention typically contains at least about 30% and less than about 100% by weight of the composition of water.

**OPTIONAL INGREDIENTS**

Optionally, the present wrinkle controlling composition can also contain the following:

**B. WRINKLE CONTROL AGENTS**

Optionally, but preferably, the composition contains an effective amount of fiber-fabric wrinkle control agent to enhance the wrinkle control performance of the composition. The wrinkle control agent is preferably selected from the group consisting of: fiber lubricant, shape retention polymer, lithium salt, perfumes, fabric care polysaccharide, and mixtures thereof. When wrinkle control agent is included it is typically included at levels of at least about 0.001% and less than about 10% of the usage composition.

**1. FIBER LUBRICANTS**

The present invention can use fiber-fabric lubricants to impart a lubricating property, or increased gliding ability, to fibers in fabric, particularly clothing. Not to be bound by theory, it is believed that water and other alcoholic solvents break, or weaken, the hydrogen bonds that hold the wrinkles in fabric, and fabric lubricants facilitate the movement of fibers with respect to one another (glide) to further release the fibers from the wrinkle condition in wet or damp fabrics. After the fabric is dried, the residual fiber

lubricant, especially silicone, can provide lubricity to reduce the tendency of fabric to re-wrinkle.

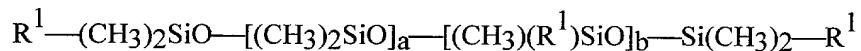
**a) Silicone**

Silicone is a preferred fiber lubricant, for the present invention, to impart a lubricating property, or increased gliding ability, to fibers in fabric, particularly clothing. Nonlimiting examples of useful silicones in the composition of the present invention include noncurable silicones such as silicone polyethers (also known as dimethicone copolyols), polydimethylsilicone and volatile silicones, and curable silicones such as aminosilicones, phenylsilicones and hydroxysilicones. The word "silicone" as used herein preferably refers to soluble, self emulsifying, or emulsified silicones, including those that are commercially available as single components or as mixture, e.g. compositions formulated by the supplier to achieve solubilization and/or emulsification of the silicone, unless otherwise described. Preferably, the silicones comprise hydrophobic moieties; are neither irritating, toxic, nor otherwise harmful when applied to fabric or when they come in contact with human skin; are chemically stable under normal use and storage conditions; and are capable of being deposited on fabric.

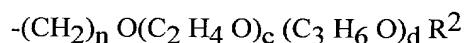
When the composition of this invention is to be dispensed from a spray dispenser in a consumer household setting, the noncurable silicones such as silicone polyether and polydimethylsilicone are preferred. Curable and/or reactive silicones such as amino-functional silicones and silicones with reactive groups such as Si-OH, Si-H, silanes, and the like, are not preferred in this situation, because the portion of the composition that is sprayed but misses the garment, and falls instead on flooring surfaces, such as rug, carpet, concrete floor, tiled floor, linoleum floor, bathtub floor, can leave a silicone layer that is cured and/or bonded to the flooring surfaces. Such silicones that are bonded to surfaces are difficult to remove from the flooring surfaces. Flooring surfaces thus become slippery and can present a safety hazard to the household members. The curable and reactive silicones can be used in compositions specifically designed for use in enclosed areas such as in a dewrinkling cabinet. Many types of aminofunctional silicones also cause fabric yellowing. Thus, the silicones that cause fabric discoloration are also not preferred.

A highly preferred, but nonlimiting class of silicones surfactants useful for the present invention is the class of silicone polyethers alternately known as dimethicone copolyols and polyalkylene oxide polysiloxanes. Typically the polyalkylene oxide polysiloxanes have a dimethyl polysiloxane hydrophobic moiety and one or more hydrophilic polyalkylene chains. The hydrophilic polyalkylene chains can be incorporated as side chains (pendant moieties) or as block copolymer moieties with the

polysiloxane hydrophobic moiety. Silicone polyethers are described by the following general formulas:



wherein a + b are from about 1 to about 50, preferably from about 1 to about 30, more 5 preferably from about 1 to about 25, and each R<sup>1</sup> is the same or different and is selected from the group consisting of methyl and a poly(ethyleneoxide/propyleneoxide) copolymer group having the general formula:



with at least one R<sup>1</sup> being a poly(ethyleneoxy/propyleneoxy) copolymer group, and 10 wherein n is 3 or 4, preferably 3; total c (for all polyalkyleneoxy side groups) has a value of from 1 to about 100, preferably from about 6 to about 100; total c+d has a value of from about 5 to about 150, preferably from about 7 to about 100 and each R<sup>2</sup> is the same or different and is selected from the group consisting of hydrogen, an alkyl having 1 to 4 carbon atoms, and an acetyl group, preferably hydrogen and/or methyl group. Each 15 polyalkylene oxide polysiloxane has at least one R<sup>1</sup> group being a poly(ethyleneoxide/propyleneoxide) copolymer group.

Nonlimiting examples of these silicone polyethers are the Silwet® materials which are available from CK-Witco. Representative Silwet® silicone polyethers which contain only ethyleneoxy (C<sub>2</sub>H<sub>4</sub>O) groups are as follows.

	Name	Average MW	Average a+b	Average total c
20	L-7608	600	1	8
	L-7607	1,000	2	17
	L-77	600	1	9
	L-7605	6,000	20	99
25	L-7604	4,000	21	53
	L-7600	4,000	11	68
	L-7657	5,000	20	76
	L-7602	3,000	20	29
	L-7622	10,000	88	75
30	L-8600	2,100		
	L-8610	1,700		
	L-8620	2,000		

Nonlimiting examples of Silwet® silicone polyethers which contain both ethyleneoxy (C<sub>2</sub> H<sub>4</sub> O) and propyleneoxy (C<sub>3</sub> H<sub>6</sub> O) groups are as follows:

Name	Average MW	EO/PO ratio
L-720	12,000	50/50
5 L-7001	20,000	40/60
L-7002	8,000	50/50
L-7210	13,000	20/80
L-7200	19,000	75/25
L-7220	17,000	20/80

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Nonlimiting examples of Silwet® silicone polyethers which contain only propyleneoxy (C<sub>3</sub> H<sub>6</sub> O) groups are as follows:

Name	Average MW
L7500	3,000
15 L7510	13,000
L7550	300
L8500	2,800

20 The molecular weight of the polyalkyleneoxy group (R<sup>1</sup>) is less than or equal to about 10,000. The preferred molecular weight of the silicone polyether is dependent on the exact functionality is a given composition. If propyleneoxy groups are present in the polyalkyleneoxy chain, they can be distributed randomly in the chain or exist as blocks. Preferred Silwets® provide lubricity to aid in wrinkle removal and can also provide softness which is especially preferred when the polymer leaves a rough feeling on the 25 surface of the fabric. Nonlimiting examples of preferred Silwets® include L77, L7001, L7200, and L7087. Some nonlimiting preferred Dow Corning® silicone polyethers include Dow Corning® 190 Dow Corning® Q2-5211. Other nonlimiting examples of silicone polyethers useful in the present invention include include the following compounds available from Dow Corning® 193, FF-400 Fluid, Q2-5220, Q4-3667, as 30 well as compounds available from Toray Dow Corning Silicone Co., Ltd. know as SH3771C, SH3772C, SH3773C, SH3746, SH3748, SH3749, SH8400, SF8410, and SH8700, KF351 (A), KF352 (A), KF354 (A), and KF615 (A) of Shin-Etsu Chemical Co., Ltd., TSF4440, TSF4445, TSF4446, TSF4452 of Toshiba Silicone Co.

When optional cyclodextrin is used, it is preferred to use silicone polyethers with higher molecular weights, at least about 5,000, preferably at least about 10,000 to prevent significant interaction with the cyclodextrin. When the silicone polyether will be used to emulsify silicone oils, provide maximal penetration, reduce viscosity of the composition, and/or enhance spray characteristics it is preferably to use a silicone polyether with a molecular weight of typically less than about 10,000, preferably less than about 8,000, and more preferably less than about 5,000.

Besides surface activity, silicone polyethers can also provide other benefits, such as antistatic benefits, lubricity, softness to fabrics, and improvements in fabric appearance.

The preparation of silicone polyethers is well known in the art. Silicone polyethers of the present invention can be prepared according to the procedure set forth in U.S. Pat. No. 3,299,112, incorporated herein by reference. Typically, silicone polyethers of the present invention are readily prepared by an addition reaction between a hydrosiloxane (i.e., a siloxane containing silicon-bonded hydrogen) and an alkenyl ether (e.g., a vinyl, allyl, or methallyl ether) of an alkoxy or hydroxy end-blocked polyalkylene oxide). The reaction conditions employed in addition reactions of this type are well known in the art and in general involve heating the reactants (e.g., at a temperature of from about 85° C. to 110° C.) in the presence of a platinum catalyst (e.g., chloroplatinic acid) and a solvent (e.g., toluene).

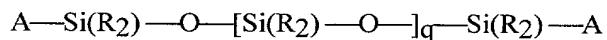
Other nonlimiting silicone compounds and emulsions including useful to the present invention includes non-curable silicones (such as but not limited to volatile silicones, silicone oils, and polydimethyl silicones) and curable silicones (such as, but not limited to aminosilicones, phenylsilicones, and hydroxylsilicones. Also useful in the present compositions are silicone emulsions that comprise silicone oils such as 346 Emulsion, 347 Emulsion, and HV-490 available from Dow Corning. Specifically, the preferred silicone oil is dimethylsiloxane silicone, more preferably volatile dimethylsiloxane. The volatile silicones provide surprisingly good fiber lubrication without the risk of unacceptable build-up on the fabric and/or surrounding surfaces due to their volatile nature. The volatile silicones also provide a desirable control over the formation of wrinkles in fabrics while the fabrics are being dried.

Preferred silicones are neither irritating, toxic, nor otherwise harmful when applied to fabric or when they come in contact with human skin, and are chemically stable under normal use and storage conditions, and are capable of being deposited on fabric.

When the composition of this invention is to be dispensed from a spray dispenser in a consumer household setting, the noncurable silicones such as polydimethylsilicone, and especially the volatile silicones, are preferred. Curable and/or reactive silicones such as amino-functional silicones and silicones with reactive groups such as Si-OH, Si-H, silanes, and the like, are not preferred in this situation, because the portion of the composition that is sprayed but misses the garment, and falls instead on flooring surfaces, such as rug, carpet, concrete floor, tiled floor, linoleum floor, bathtub floor, can leave a silicone layer that is cured and/or bonded to the flooring surfaces. Such silicones that are bonded to surfaces are difficult to remove from the flooring surfaces. The flooring surfaces thus become slippery and can present a safety hazard to the household members. The curable and reactive silicones can be used in compositions specifically designed for use in enclosed areas such as in a dewrinkling enclosure, e.g., cabinet. Many types of aminofunctional silicones also cause fabric yellowing. Thus, the silicones that cause fabric discoloration are also not preferred. Indeed, the present compositions are preferably essentially free of any material that would soil or stain fabrics or are essentially free of material at a level that would soil or stain fabrics.

Another preferred silicone is volatile silicone fluid which can be cyclic silicone fluid of the formula  $[(CH_3)_2SiO]_n$  where n ranges between about 3 to about 7, preferably about 5, or a linear silicone polymer fluid having the formula  $(CH_3)_3SiO[(CH_3)_2SiO]_mSi(CH_3)_3$  where m can be 0 or greater and has an average value such that the viscosity at 25°C of the silicone fluid is preferably about 5 centistokes or less.

The non-volatile silicones that are useful in the composition of the present invention are polyalkyl and/or phenylsilicones silicone fluids and gums with the following structure:



The alkyl groups substituted on the siloxane chain (R) or at the ends of the siloxane chains (A) can have any structure as long as the resulting silicones remain fluid at room temperature.

Each R group preferably can be alkyl, aryl, hydroxy, or hydroxyalkyl group, and mixtures thereof, more preferably, each R is methyl, ethyl, propyl or phenyl group, most preferably R is methyl. Each A group which blocks the ends of the silicone chain can be hydrogen, methyl, methoxy, ethoxy, hydroxy, propoxy, and aryloxy group, preferably methyl. Suitable A groups include hydrogen, methyl, methoxy, ethoxy, hydroxy, and propoxy. q is preferably an integer from about 7 to about 8,000. The preferred silicones are polydimethyl siloxanes; more preferred silicones are polydimethyl siloxanes having a

viscosity of from about 50 to about 1000,000 centistokes at 25°C. Mixtures of volatile silicones and non-volatile polydimethyl siloxanes are also preferred. Suitable examples include silicones offered by Dow Corning Corporation under the trade names 200 Fluid and 245 Fluid, and the General Electric Company under the trade names SF1173, SF1202, SF1204, SF96, and Viscasil®.

5 Other useful silicone materials, but less preferred than polydimethylsiloxanes, include materials of the formula:

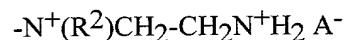
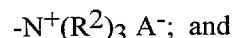
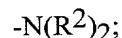
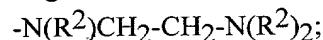


10 wherein x and y are integers which depend on the molecular weight of the silicone, preferably having a viscosity of from about 10,000 cst to about 500,000 cst at 25°C. This material is also known as "amodimethicone". Although silicones with a high number, e.g., greater than about 0.5 millimolar equivalent of amine groups can be used, they are not preferred because they can cause fabric yellowing.

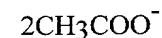
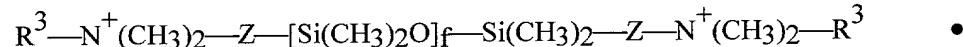
15 Similarly, silicone materials which can be used correspond to the formulas:



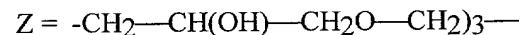
wherein G is selected from the group consisting of hydrogen, phenyl, OH, and/or C<sub>1</sub>-C<sub>8</sub> alkyl; a denotes 0 or an integer from 1 to 3; b denotes 0 or 1; the sum of n + m is a number from 1 to about 2,000; R<sup>1</sup> is a monovalent radical of formula C<sub>p</sub>H<sub>2p</sub>L in which p is an integer from 2 to 8 and L is selected from the group consisting of:



wherein each R<sup>2</sup> is chosen from the group consisting of hydrogen, phenyl, benzyl, saturated hydrocarbon radical, and each A<sup>-</sup> denotes compatible anion, e.g., a halide ion; and



wherein



R<sup>3</sup> denotes a long chain alkyl group; and

f denotes an integer of at least about 2.

In the formulas herein, each definition is applied individually and averages are included.

Another silicone material which can be used, but is less preferred than polydimethyl siloxanes, has the formula:



wherein n and m are the same as before. The preferred silicones of this type are those which do not cause fabric discoloration.

5 Mixtures of silicone are also preferred to achieve a range of properties within one composition. And in some aspects of the invention, mixtures of silicones are highly useful. For instance, when silicone oils are used, these can be very difficult to emulsify. Surprisingly, it is found that silicone polyethers provide an extremely effective means of 10 solubilizing silicone oils.

**b) Synthetic solid particles**

15 Solid polymeric particles of average particle size smaller than about 10 microns, preferably smaller than 5 microns, more preferably smaller than about 1 micron, e.g., Velustrol® P-40 oxidized polyethylene emulsion available from Clariant, can be used as a lubricant, also Tospearl™ 105, 120, 130, 145, 240 polydimethyl siloxane polymers available from GE Silicones, since they can provide a "roller-bearing" action. When 20 solid polymeric particles are present, they are present at an effective amount to provide lubrication of the fibers, typically from about 0.01% to about 3%, preferably from about 0.05% to about 1%, more preferably from about 0.1% to about 0.5%, by weight of the usage composition.

**c) Quaternary Ammonium Compounds**

25 Although many quaternary ammonium compounds with alkyl substituents are suitable for this composition, quaternary ammonium compounds that contain hydrocarbon groups, including substituted groups and groups that are part of, e.g., acyl groups, which are unsaturated or branched are particularly suited for this composition. In some cases, amine precursors of the quaternary ammonium compounds can themselves be useful in this composition.

30 Suitable quaternary ammonium compounds for use in the wrinkle composition have been previously disclosed in U. S. Pat. No. 5,759,990, issued Jun. 2, 1998 in the names of E. H. Wahl, H. B. Tordil, T. Trinh, E. R. Carr, R. O. Keys, and L. M. Meyer, for Concentrated Fabric Softening Composition with Good Freeze/Thaw Recovery and 35 Highly Unsaturated Fabric Softener Compound Therefor, and in U. S. Pat. No. 5,747,443, issued May 5, 1998 in the names of Wahl, Trinh, Gosselink, Letton, and Sivik for Fabric Softening Compound/Composition. An indicator of the suitability of quaternary ammonium actives for use in the compositions of the present invention is the phase transition temperature. Preferably, the phase transition temperature of the quaternary

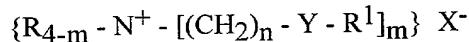
ammonium active or mixture of actives, containing less than about 5% organic solvent or water, is less than about 50°C, more preferably less than about 35°C, even more preferably less than about 20°C, and yet even more preferably less than about 10°C, or is amorphous and has no significant endothermic phase transition in the region from about -50°C to about 100°C.

The phase transition temperature can be measured with a Mettler TA 3000 differential scanning calorimeter with Mettler TC 10A Processor.

Typical suitable quaternary ammonium compounds or amine precursors are defined hereinafter.

Preferred Diester Quaternary Ammonium Active Compound (DEQA)

(1) The first type of DEQA preferably comprises, as the principal active, [DEQA (1)] compounds of the formula

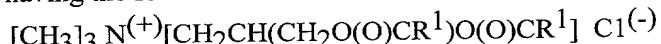


wherein each R substituent is either hydrogen, a short chain C<sub>1</sub>-C<sub>6</sub>, preferably C<sub>1</sub>-C<sub>3</sub> alkyl or hydroxyalkyl group, e.g., methyl (most preferred), ethyl, propyl, hydroxyethyl, and the like, poly (C<sub>2-3</sub> alkoxy), preferably polyethoxy, group, benzyl, or mixtures thereof; each m is 2 or 3; each n is from 1 to about 4, preferably 2; each Y is -O-(O)C-, -C(O)-O-, -NR-C(O)-, or -C(O)-NR-; the sum of carbons in each R<sup>1</sup>, plus one when Y is -O-(O)C- or -NR-C(O) -, is C<sub>12</sub>-C<sub>22</sub>, preferably C<sub>14</sub>-C<sub>20</sub>, with each R<sup>1</sup> being a hydrocarbyl, or substituted hydrocarbyl group, and X<sup>-</sup> can be any quaternary ammonium-compatible anion, preferably, chloride, bromide, methylsulfate, ethylsulfate, sulfate, and nitrate, more preferably chloride or methyl sulfate (As used herein, the "percent of quaternary ammonium active" containing a given R<sup>1</sup> group is based upon taking a percentage of the total active based upon the percentage that the given R<sup>1</sup> group is, of the total R<sup>1</sup> groups present.);

(2) A second type of DEQA active [DEQA (2)] has the formula:



wherein each Y, R, R<sup>1</sup>, and X<sup>-</sup> have the same meanings as before. Such compounds include those having the formula:

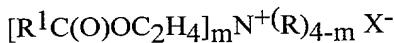


wherein each R is a methyl or ethyl group and preferably each R<sup>1</sup> is in the range of C<sub>15</sub> to C<sub>19</sub>. As used herein, when the diester is specified, it can include the monoester that is present. The amount of monoester that can be present is the same as in DEQA (1).

These types of agents and general methods of making them are disclosed in U.S. Pat. No. 4,137,180, Naik et al., issued Jan. 30, 1979, which is incorporated herein by

reference. An example of preferred DEQA (2) is the "propyl" ester quaternary ammonium active having the formula 1,2-di(acyloxy)-3-trimethylammoniopropane chloride, where the acyl is the same as that of FA<sup>1</sup> disclosed hereinafter.

Some preferred wrinkle compositions of the present invention contain as an essential component from about 0.025% to about 10%, preferably from about 0.05% to about 5%, more preferably from about 0.1% to about 3%, and even more preferably from about 0.2% to about 2% by weight of the composition, of quaternary ammonium active having the formula:



wherein each R<sup>1</sup> in a compound is a C<sub>6</sub>-C<sub>22</sub> hydrocarbyl group, preferably having an IV from about 70 to about 140 based upon the IV of the equivalent fatty acid with the cis/trans ratio preferably being as described hereinafter, m is a number from 1 to 3 on the weight average in any mixture of compounds, each R in a compound is a C<sub>1-3</sub> alkyl or hydroxy alkyl group, the total of m and the number of R groups that are hydroxyethyl groups equaling 3, and X is a quaternary ammonium compatible anion, preferably methyl sulfate. Preferably the cis:trans isomer ratio of the fatty acid (of the C18:1 component) is at least about 1:1, preferably about 2:1, more preferably about 3:1, and even more preferably about 4:1, or higher.

These preferred compounds, or mixtures of compounds, have (a) either a Hunter "L" transmission of at least about 85, typically from about 85 to about 95, preferably from about 90 to about 95, more preferably above about 95, if possible, (b) only low, relatively non-detectable levels, at the conditions of use, of odorous compounds selected from the group consisting of: isopropyl acetate; 2,2'-ethylidenebis(oxy)bis-propane; 1,3,5-trioxane; and/or short chain fatty acid (4-12, especially 6-10, carbon atoms) esters, especially methyl esters; or (c) preferably, both.

The Hunter L transmission is measured by (1) mixing the quaternary ammonium active with solvent at a level of about 10% of active, to assure clarity, the preferred solvent being ethoxylated (one mole EO) 2,2,4-trimethyl-1,3-pentanediol and (2) measuring the L color value against distilled water with a Hunter ColorQUEST® colorimeter made by Hunter Associates Laboratory, Reston, Virginia.

The level of odorant is defined by measuring the level of odorant in a headspace over a sample of the quaternary ammonium active (about 92% active). Chromatograms are generated using about 200 mL of head space sample over about 2.0 grams of sample. The head space sample is trapped on to a solid absorbent and thermally desorbed onto a

column directly via cryofocussing at about -100°C. The identifications of materials is based on the peaks in the chromatograms. Some impurities identified are related to the solvent used in the quaternization process, (e.g., ethanol and isopropanol). The ethoxy and methoxy ethers are typically sweet in odor. There are C<sub>6</sub> -C<sub>8</sub> methyl esters found in a typical current commercial sample, but not in the typical quaternary ammonium actives of this invention. These esters contribute to the perceived poorer odor of the current commercial samples. The level of each odorant in ng/L found in the head space over a preferred active is as follows: Isopropyl acetate - < 1; 1,3,5-trioxane - < 5; 2,2'-ethylidenebis(oxy)-bispropane - < 1; C<sub>6</sub> methyl ester - < 1; C<sub>8</sub> Methyl ester - < 1; and C<sub>10</sub> Methyl ester - < 1.

The acceptable level of each odorant is as follows: isopropyl acetate should be less than about 5, preferably less than about 3, and more preferably less than about 2, nanograms per liter (ng/L.); 2,2'-ethylidenebis(oxy)bis-propane should be less than about 200, preferably less than about 100, more preferably less than about 10, and even more preferably less than about 5, nanograms per liter (ng/L.); 1,3,5-trioxane should be less than about 50, preferably less than about 20, more preferably less than about 10, and even more preferably less than about 7, nanograms per liter (ng/L.); and/or each short chain fatty acid (4-12, especially 6-10, carbon atoms) ester, especially methyl esters should be less than about 4, preferably less than about 3, and more preferably less than about 2, nanograms per liter (ng/L.).

The elimination of color and odor materials can either be accomplished after formation of the compound, or, preferably, by selection of the reactants and the reaction conditions. Preferably, the reactants are selected to have good odor and color. For example, it is possible to obtain fatty acids, or their esters, for sources of the long fatty acyl group, that have good color and odor and which have extremely low levels of short chain (C<sub>4</sub>-12, especially C<sub>6</sub>-10) fatty acyl groups. Also, the reactants can be cleaned up prior to use. For example, the fatty acid reactant can be double or triple distilled to remove color and odor causing bodies and remove short chain fatty acids. Additionally, the color of a triethanolamine reactant, if used, needs to be controlled to a low color level (e.g., a color reading of about 20 or less on the APHA scale). The degree of clean up required is dependent on the level of use, clarity of the product, and the presence of other ingredients. For example, adding a dye or starting with an opaque product can cover up some colors. However, for clear and/or light colored products, the color must be almost non-detectable. This is especially true as the level of the quaternary ammonium compound used in the product goes up. The degree of clean up would be especially

important in products sold as concentrates that are intended for dilution by the consumer. Similarly, the odor can be covered up by higher levels of perfume, but as perfume level increases, cost associated with this approach increases too, also many consumers prefer a product with a lighter scent which precludes the approach of using higher perfume levels. 5 Odor quality can be further improved by use of, e.g., ethanol as the quaternization reaction solvent.

Preferred biodegradable quaternary ammonium compounds comprise quaternary ammonium salt, the quaternary ammonium salt being a quaternized product of the condensation reaction between:

10 a)-a fraction of saturated or unsaturated, linear or branched fatty acids, or of derivatives of said acids, said fatty acids or derivatives each possessing a hydrocarbon chain in which the number of atoms is between 5 and 21, and  
b)-triethanolamine,  
characterized in that said condensation product has an acid value, measured by titration of  
15 the condensation product with a standard KOH solution against a phenolphthalein indicator, of less than about 6.5.

The acid value is preferably less than or equal to about 5, more preferably less than about 3.

20 The acid value is determined by titration of the condensation product with a standard KOH solution against a phenolphthalein indicator according to ISO#53402. The Acid Value (AV) is expressed as mg KOH/g of the condensation product.

25 These quaternary ammonium compounds for use herein are typically mixtures of materials. The weight percentages of compounds wherein one (monoester), two (diester), or three (triester) of the triethanolamine hydroxy groups is esterified with a fatty acyl group are as follows: Monoester - from about 12% to about 22%; diester - from about 43% to about 57%; and triester - from about 13% to about 28%. These compounds, as formed and used in the formulation of wrinkle compositions, typically contain from about 6% to about 20% by weight of solvent, e.g., from about 3% to about 10% of a lower molecular alcohol like ethanol and from about 3% to about 10% of solvent that is more hydrophobic, like hexylene glycol.  
30

35 Preferred cationic, preferably biodegradable, quaternary, ammonium compounds can contain the group -(O)CR<sup>1</sup> which is derived from animal fats, unsaturated, and polyunsaturated, fatty acids, e.g., oleic acid, and/or partially hydrogenated fatty acids, derived from vegetable oils and/or partially hydrogenated vegetable oils, such as, canola oil, safflower oil, peanut oil, sunflower oil, corn oil, soybean oil, tall oil, rice bran oil, etc.

Non-limiting examples of fatty acids (FA) are listed in U.S. Pat. No. 5,759,990 at column 4, lines 45-66.

Mixtures of fatty acids, and mixtures of FAs that are derived from different fatty acids can be used, and are preferred. Nonlimiting examples of FA's that can be blended, to form FA's of this invention are as follows:

<u>Fatty Acyl Group</u>	<u>FA<sup>1</sup></u>	<u>FA<sup>2</sup></u>	<u>FA<sup>3</sup></u>
C <sub>14</sub>	0	0	1
C <sub>16</sub>	3	11	25
C <sub>18</sub>	3	4	20
C <sub>14:1</sub>	0	0	0
C <sub>16:1</sub>	1	1	0
C <sub>18:1</sub>	79	27	45
C <sub>18:2</sub>	13	50	6
C <sub>18:3</sub>	1	7	0
Unknowns	0	0	3
<i>Total</i>	100	100	100
IV	99	125-138	56
cis/trans (C <sub>18:1</sub> )	5 - 6	Not Available	7
TPU	14	57	6

FA<sup>1</sup> is a partially hydrogenated fatty acid prepared from canola oil, FA<sup>2</sup> is a fatty acid prepared from soy bean oil, and FA<sup>3</sup> is a slightly hydrogenated tallow fatty acid.

Preferred quaternary ammonium actives contain an effective amount of molecules containing two ester linked hydrophobic groups [R<sup>1</sup>C(CO)O-], said actives being referred to herein as "DEQA's", are those that are prepared as a single DEQA from blends of all the different fatty acids that are represented (total fatty acid blend), rather than from blends of mixtures of separate finished DEQA's that are prepared from different portions of the total fatty acid blend.

It is preferred that at least a majority of the fatty acyl groups are unsaturated, e.g., from about 50% to 100%, preferably from about 55% to about 99%, more preferably from about 60% to about 98%, and that the total level of active containing polyunsaturated fatty acyl groups (TPU) be preferably from 0% to about 30%. The cis/trans ratio for the unsaturated fatty acyl groups is usually important, with the cis/trans ratio being from about 1:1 to about 50:1, the minimum being about 1:1, preferably at least about 3:1, and more preferably from about 4:1 to about 20:1. (As used herein, the "percent of quaternary ammonium active" containing a given R<sup>1</sup> group is the same as the percentage of that same R<sup>1</sup> group is to the total R<sup>1</sup> groups used to form all of the quaternary ammonium actives.)

The unsaturated, including the preferred polyunsaturated, fatty acyl and/or alkylene groups, discussed hereinbefore and hereinafter, surprisingly provide good dewrinkling and effective softening, but also provide better rewetting characteristics, good antistatic characteristics, and especially, superior recovery after freezing and thawing.

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These unsaturated actives are also easier to process at lower temperatures. These highly unsaturated materials (total level of active containing polyunsaturated fatty acyl groups (TPU) being typically from about 3% to about 30%, with only the low amount of solvent that normally is associated with such materials, i.e., from about 5% to about 20%, preferably from about 8% to about 25%, more preferably from about 10 to about 20%, weight of the total quaternary ammonium/solvent mixture are easier to formulate into the product and remain in stable solutions, emulsions, and/or dispersions longer. This ability to process the actives at low temperatures is especially important for the polyunsaturated groups, since it minimizes degradation. Additional protection against degradation can be provided when the compounds and wrinkle compositions contain effective antioxidants, chelants, and/or reducing agents, as disclosed hereinafter.

It will be understood that substituents R and R<sup>1</sup> can optionally be substituted with various groups such as alkoxy or hydroxyl groups, and can be straight, or branched so long as the R<sup>1</sup> groups maintain their basically hydrophobic character.

A preferred long chain DEQA is the DEQA prepared from sources containing high levels of polyunsaturation, i.e., N,N-di(acyl-oxyethyl)-N,N-methylhydroxyethylammonium methyl sulfate, where the acyl is derived from fatty acids containing sufficient polyunsaturation, e.g., mixtures of tallow fatty acids and soybean fatty acids. Another preferred long chain DEQA is the dioleyl (nominally) DEQA, i.e., DEQA in which N,N-di(oleoyl-oxyethyl)-N,N-methylhydroxyethylammonium methyl sulfate is the major ingredient. Preferred sources of fatty acids for such DEQAs are vegetable oils, and/or partially hydrogenated vegetable oils, with high contents of unsaturated, e.g., oleoyl groups.

As used herein, when the DEQA diester (m=2) is specified, it can include the monoester (m=1) and/or triester (m=3) that are present. Preferably, at least about 30% of the DEQA is in the diester form, and from 0% to about 30% can be DEQA monoester, e.g., there are three R groups and one R<sup>1</sup> group.

The above compounds can be prepared using standard reaction chemistry. In one synthesis of a di-ester variation of DTDMAC, triethanolamine of the formula N(CH<sub>2</sub>CH<sub>2</sub>OH)<sub>3</sub> is esterified, preferably at two hydroxyl groups, with an acid chloride of the formula R<sup>1</sup>C(O)Cl, to form an amine which can be made cationic by acidification

(one R is H) to be one type of active, or then quaternized with an alkyl halide, RX, to yield the desired reaction product (wherein R and R<sup>1</sup> are as defined hereinbefore). However, it will be appreciated by those skilled in the chemical arts that this reaction sequence allows a broad selection of agents to be prepared.

5        In preferred DEQA (1) and DEQA (2) quaternary ammonium actives, each R<sup>1</sup> is a hydrocarbyl, or substituted hydrocarbyl, group, preferably, alkyl, monounsaturated alkenyl, and polyunsaturated alkenyl groups, with the quaternary ammonium active containing polyunsaturated alkenyl groups being preferably at least about 3%, more preferably at least about 5%, more preferably at least about 10%, and even more preferably at least about 15%, by weight of the total quaternary ammonium active present; the actives preferably containing mixtures of R<sup>1</sup> groups, especially within the individual molecules.

10      The DEQAs herein can also contain a low level of fatty acid, which can be from unreacted starting material used to form the DEQA and/or as a by-product of any partial degradation (hydrolysis) of the quaternary ammonium active in the finished composition. It is preferred that the level of free fatty acid be low, preferably below about 15%, more preferably below about 10%, and even more preferably below about 5%, by weight of the quaternary ammonium active.

15      The quaternary ammonium actives herein are preferably prepared by a process wherein a chelant, preferably a diethylenetriaminepentaacetate (DTPA) and/or an ethylene diamine-N,N'-disuccinate (EDDS) is added to the process. Another acceptable chelant is tetrakis-(2-hydroxylpropyl) ethylenediamine (TPED). Also, preferably, antioxidants are added to the fatty acid immediately after distillation and/or fractionation and/or during the esterification reactions and/or post-added to the finished quaternary ammonium active. The resulting active has reduced discoloration and malodor associated therewith.

20      The total amount of added chelating agent is preferably within the range of from about 10 ppm to about 5,000 ppm, more preferably within the range of from about 100 ppm to about 2500 ppm by weight of the formed quaternary ammonium active. The source of triglyceride is preferably selected from the group consisting of animal fats, vegetable oils, partially hydrogenated vegetable oils, and mixtures thereof. More preferably, the vegetable oil or partially hydrogenated vegetable oil is selected from the group consisting of canola oil, partially hydrogenated canola oil, safflower oil, partially hydrogenated safflower oil, peanut oil, partially hydrogenated peanut oil, sunflower oil, partially hydrogenated sunflower oil, corn oil, partially hydrogenated corn oil, soybean oil, partially hydrogenated soybean oil, tall oil, partially hydrogenated tall oil, rice bran

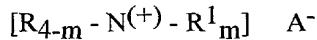
oil, partially hydrogenated rice bran oil, and mixtures thereof. Most preferably, the source of triglyceride is canola oil, partially hydrogenated canola oil, and mixtures thereof. The process can also include the step of adding from about 0.01% to about 2% by weight of the composition of an antioxidant compound to any or all of the steps in the processing of the triglyceride up to, and including, the formation of the quaternary ammonium active.

5 The above processes produce a quaternary ammonium active with reduced coloration and malodor.

Other Quaternary Ammonium Actives

10 Other less preferred quaternary ammonium actives include, but are not limited to, those disclosed hereinafter. When quaternary ammonium compounds are include in the wrinkle composition, these less preferred quaternary ammonium actives can be present in minor amounts, either alone, or as part of the total amount of quaternary ammonium in the said composition, said other fabric quaternary ammonium active being selected from:

15 (1) quaternary ammonium having the formula:



20 wherein each m is 2 or 3, each  $R^1$  is a  $C_6$ - $C_{22}$ , preferably  $C_{14}$ - $C_{20}$ , but no more than one being less than about  $C_{12}$  and then the other is at least about 16, hydrocarbyl, or substituted hydrocarbyl substituent, preferably  $C_{10}$ - $C_{20}$  alkyl or alkenyl (unsaturated alkyl, including polyunsaturated alkyl, also referred to sometimes as "alkylene"), most preferably  $C_{12}$ - $C_{18}$  alkyl or alkenyl, and where the Iodine Value (hereinafter referred to as "IV") of a fatty acid containing this  $R^1$  group is from about 70 to about 140, more preferably from about 80 to about 130; and most preferably from about 90 to about 115 (as used herein, the term "Iodine Value" means the Iodine Value of a "parent" fatty acid, or "corresponding" fatty acid, which is used to define a level of unsaturation for an  $R^1$  group that is the same as the level of unsaturation that would be present in a fatty acid containing the same  $R^1$  group) with, preferably, a cis/trans ratio of from about 1:1 to about 50:1, the minimum being 1:1, preferably from about 2:1 to about 40:1, more preferably from about 3:1 to about 30:1, and even more preferably from about 4:1 to about 20:1; each  $R^1$  can also preferably be a branched chain  $C_{14}$ - $C_{22}$  alkyl group, preferably a branched chain  $C_{16}$ - $C_{18}$  group; each R is H or a short chain  $C_1$ - $C_6$ , preferably  $C_1$ - $C_3$  alkyl or hydroxyalkyl group, e.g., methyl (most preferred), ethyl, propyl, hydroxyethyl, and the like, benzyl, or  $(R^2 O)_{2-4}H$  where each  $R^2$  is a  $C_{1-6}$  alkylene group; and  $A^-$  is a quaternary ammonium compatible anion, preferably, chloride,

bromide, methylsulfate, ethylsulfate, sulfate, and nitrate, more preferably chloride and methyl sulfate;

(2) quaternary ammonium having the formula:

5 wherein each R, R<sup>1</sup>, and A<sup>-</sup> have the definitions given above; each R<sup>2</sup> is a C<sub>1-6</sub> alkylene group, preferably an ethylene group; and G is an oxygen atom or an -NR-group;

(3) active having the formula:

10

wherein R<sup>1</sup>, R<sup>2</sup> and G are defined as above;

15

(4) reaction products of substantially unsaturated and/or branched chain higher fatty acids with dialkylenetriamines in, e.g., a molecular ratio of about 2:1, said reaction products containing compounds of the formula:



wherein R<sup>1</sup>, R<sup>2</sup> are defined as above, and each R<sup>3</sup> is a C<sub>1-6</sub> alkylene group, preferably an ethylene group;

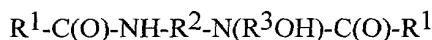
(5) quaternary ammonium having the formula:

20 [R<sup>1</sup>-C(O)-NR-R<sup>2</sup>-N(R)<sub>2</sub>-R<sup>3</sup>-NR-C(O)-R<sup>1</sup>]<sup>+</sup> A<sup>-</sup>

wherein R, R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and A<sup>-</sup> are defined as above;

25

(6) the reaction product of substantially unsaturated and/or branched chain higher fatty acid with hydroxyalkylalkylenediamines in a molecular ratio of about 2:1, said reaction products containing compounds of the formula:



wherein R<sup>1</sup>, R<sup>2</sup> and R<sup>3</sup> are defined as above;

(7) quaternary ammonium having the formula:

wherein R, R<sup>1</sup>, R<sup>2</sup>, and A<sup>-</sup> are defined as above; and

5 Other optional but highly desirable cationic compounds which can be used in combination with the above quaternary ammonium actives are compounds containing one long chain acyclic C<sub>8</sub>-C<sub>22</sub> hydrocarbon group, selected from the group consisting of:

(8) acyclic quaternary ammonium salts having the formula:

[R<sup>1</sup>—N(R<sup>5</sup>)<sub>2</sub>—R<sup>6</sup>]<sup>+</sup> A<sup>-</sup>

10 wherein R<sup>5</sup> and R<sup>6</sup> are C<sub>1</sub>-C<sub>4</sub> alkyl or hydroxyalkyl groups, and R<sup>1</sup> and A<sup>-</sup> are defined as herein above;

(9) substituted imidazolinium salts having the formula:

wherein R<sup>7</sup> is hydrogen or a C<sub>1</sub>-C<sub>4</sub> saturated alkyl or hydroxyalkyl group, and R<sup>1</sup> and A<sup>-</sup> are defined as hereinabove;

(10) substituted imidazolinium salts having the formula:

wherein R<sup>5</sup> is a C<sub>1</sub>-C<sub>4</sub> alkyl or hydroxyalkyl group, and R<sup>1</sup>, R<sup>2</sup>, and A<sup>-</sup> are as defined above;

20 (11) alkylpyridinium salts having the formula:

wherein R<sup>4</sup> is an acyclic aliphatic C<sub>8</sub>-C<sub>22</sub> hydrocarbon group and A<sup>-</sup> is an anion; and

(12) alkanamide alkylene pyridinium salts having the formula:

25

wherein R<sup>1</sup>, R<sup>2</sup> and A<sup>-</sup> are defined as herein above; and mixtures thereof.

Examples of Compound (8) are the monoalkenyltrimethylammonium salts such as monooleyltrimethylammonium chloride, monocanolatrimethylammonium chloride, and soyatrimethylammonium chloride. Monooleyltrimethylammonium chloride and

monocanoltrimethylammonium chloride are preferred. Other examples of Compound (8) are soyatrimethylammonium chloride available from Witco Corporation under the trade name Adogen® 415, erucyltrimethylammonium chloride wherein R<sup>1</sup> is a C<sub>22</sub> hydrocarbon group derived from a natural source; soyadimethylethylammonium ethylsulfate wherein R<sup>1</sup> is a C<sub>16</sub>-C<sub>18</sub> hydrocarbon group, R<sup>5</sup> is a methyl group, R<sup>6</sup> is an ethyl group, and A<sup>-</sup> is an ethylsulfate anion; and methyl bis(2-hydroxyethyl)oleylammonium chloride wherein R<sup>1</sup> is a C<sub>18</sub> hydrocarbon group, R<sup>5</sup> is a 2-hydroxyethyl group and R<sup>6</sup> is a methyl group.

Additional actives that can be used herein are disclosed, at least generically for the basic structures, in U.S. Pat. Nos. 3,861,870, Edwards and Diehl; 4,308,151, Cambre; 3,886,075, Bernardino; 4,233,164, Davis; 4,401,578, Verbruggen; 3,974,076, Wiersema and Rieke; and 4,237,016, Rudkin, Clint, and Young, all of said patents being incorporated herein by reference. The additional actives herein are preferably those that are highly unsaturated versions of the traditional quaternary ammonium actives, i.e., di-long chain alkyl nitrogen derivatives, normally cationic materials, such as dioleyldimethylammonium chloride and imidazolinium compounds as described hereinafter. Examples of more biodegradable fabric quaternary ammonium actives can be found in U.S. Pat. Nos. 3,408,361, Mannheimer, issued Oct. 29, 1968; 4,709,045, Kubo et al., issued Nov. 24, 1987; 4,233,451, Pracht et al., issued Nov. 11, 1980; 4,127,489, Pracht et al., issued Nov. 28, 1979; 3,689,424, Berg et al., issued Sept. 5, 1972; 4,128,485, Baumann et al., issued Dec. 5, 1978; 4,161,604, Elster et al., issued July 17, 1979; 4,189,593, Wechsler et al., issued Feb. 19, 1980; and 4,339,391, Hoffman et al., issued July 13, 1982, said patents being incorporated herein by reference.

Examples of Compound (1) are dialkylenedimethylammonium salts such as dicanoladimethylammonium chloride, dicanoladimethylammonium methylsulfate, di(partially hydrogenated soybean, cis/trans ratio of about 4:1)dimethylammonium chloride, dioleyldimethylammonium chloride. Dioleyldimethylammonium chloride and di(canola)dimethylammonium chloride are preferred. An example of commercially available dialkylenedimethylammonium salts usable in the present invention is dioleyldimethylammonium chloride available from Witco Corporation under the trade name Adogen® 472.

An example of Compound (2) is 1-methyl-1-oleylamidoethyl-2-oleylimidazolinium methylsulfate wherein R<sup>1</sup> is an acyclic aliphatic C<sub>15</sub>-C<sub>17</sub> hydrocarbon group, R<sup>2</sup> is an ethylene group, G is a NH group, R<sup>5</sup> is a methyl group and

A<sup>-</sup> is a methyl sulfate anion, available commercially from the Witco Corporation under the trade name Varisoft® 3690.

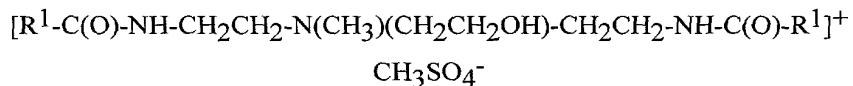
5 An example of Compound (3) is 1-oleylamidoethyl-2-oleylimidazoline wherein R<sup>1</sup> is an acyclic aliphatic C<sub>15</sub>-C<sub>17</sub> hydrocarbon group, R<sup>2</sup> is an ethylene group, and G is a NH group.

An example of Compound (4) is reaction products of oleic acids with diethylenetriamine in a molecular ratio of about 2:1, said reaction product mixture containing N,N"-dioleoyldiethylenetriamine with the formula:



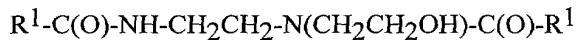
10 wherein R<sup>1</sup>-C(O) is oleoyl group of a commercially available oleic acid derived from a vegetable or animal source, such as Emersol® 223LL or Emersol® 7021, available from Henkel Corporation, and R<sup>2</sup> and R<sup>3</sup> are divalent ethylene groups.

15 An example of Compound (5) is a difatty amidoamine based active having the formula:



wherein R<sup>1</sup>-C(O) is oleoyl group, available commercially from the Witco Corporation under the trade name Varisoft® 222LT.

20 An example of Compound (6) is reaction products of commercial "oleic" acids with N-2-hydroxyethylenediamine in a molecular ratio of about 2:1, said reaction product mixture containing a compound of the formula:



25 wherein R<sup>1</sup>-C(O) is oleoyl group of a commercially available oleic acid derived from a vegetable or animal source, such as Emersol® 223LL or Emersol® 7021, available from Henkel Corporation.

An example of Compound (7) is the diquaternary compound having the formula:

wherein R<sup>1</sup> is derived from oleic acid, and the compound is available from Witco Company.

An example of Compound (11) is 1-ethyl-1-(2-hydroxyethyl)-2-isoheptadecylimidazolinium ethylsulfate wherein R<sup>1</sup> is a C<sub>17</sub> hydrocarbon group, R<sup>2</sup> is an ethylene group, R<sup>5</sup> is an ethyl group, and A<sup>-</sup> is an ethylsulfate anion.

Anion A

5 In the cationic nitrogenous salts herein, the anion A<sup>-</sup>, which is any quaternary ammonium compatible anion, provides electrical neutrality. Most often, the anion used to provide electrical neutrality in these salts is from a strong acid, especially a halide, such as chloride, bromide, or iodide. However, other anions can be used, such as methylsulfate, ethylsulfate, acetate, formate, sulfate, carbonate, and the like. Chloride and methylsulfate are preferred herein as anion A. The anion can also, but less preferably, carry a double charge in which case A<sup>-</sup> represents half a group.

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Polyquaternary amine compounds also act as suitable quaternary compounds to increase fabric (fiber) lubricity and these are disclosed for use herein by reference to prior art including:

15 European Patent Application EP 0,803,498, A1, Robert O. Keys and Floyd E. Friedli, filed April 25, 1997;

British Pat. 808,265, issued Jan. 28, 1956 to Arnold Hoffman & Co., Incorporated;

20 British Pat. 1,161,552, Koebner and Potts, issued Aug. 13, 1969;

DE 4,203,489 A1, Henkel, published Aug. 12, 1993;

EP 0,221,855, Topfl, Heinz, and Jorg, issued Nov. 3, 1986;

EP 0,503,155, Rewo, issued Dec. 20, 1991;

EP 0,507,003, Rewo, issued Dec. 20, 1991

EPA 0,803,498, published October 29, 1997;

25 French Pat. 2,523,606, Marie-Helene Fraikin, Alan Dillarstone, and Marc Couterau, filed Mar. 22, 1983;

Japanese Pat. 84-273918, Terumi Kawai and Hiroshi Kitamura, 1986;

Japanese Pat. 2-011,545, issued to Kao Corp., Jan. 16, 1990;

U.S. Pat. 3,079,436, Hwa, issued Feb. 26, 1963;

30 U.S. Pat. 4,418,054, Green et al., issued Nov. 29, 1983;

U.S. Pat. 4,721,512, Topfl, Abel, and Binz, issued Jan. 26, 1988;

U.S. Pat. 4,728,337, Abel, Topfl, and Riehen, issued Mar. 1, 1988;

U.S. Pat. 4,906,413, Topfl and Binz, issued Mar. 6, 1990;

U.S. Pat. 5,194,667, Oxenrider et al., issued Mar. 16, 1993;

35 U.S. Pat. 5,235,082, Hill and Snow, issued Aug. 10, 1993;

U.S. Pat. 5,670,472, Keys, issued Sep. 23, 1997;

Weirong Miao, Wei Hou, Lie Chen, and Zongshi Li, Studies on Multifunctional Finishing Agents, Riyong Huaxue Gonye, No. 2, pp. 8-10, 1992; Yokagaku, Vol 41, No. 4 (1992); and

5 Disinfection, Sterilization, and Preservation, 4<sup>th</sup> Edition, published 1991 by Lea & Febiger, Chapter 13, pp. 226-30. All of these references are incorporated herein, in their entirety, by reference.

It will be understood that suitable wrinkle compositions can include combinations of quaternary ammonium actives disclosed herein.

10 In addition to lubricating fibers, quaternary ammonium compound disclosed herein can offer addition benefits including improved softening and handfeel as well as protection and/or restoration of fibers and fabric appearance.

## 2. SHAPE RETENTION POLYMERS

15 These polymers can be natural, or synthetic, and can act by forming a film, and/or by providing adhesive properties. E.g., the present invention can optionally use film-forming and/or adhesive polymer to impart shape retention to fabric, particularly clothing. By "adhesive" it is meant that when applied as a solution or a dispersion to a fiber surface and dried, the polymer can attach to the surface. The polymer can form a film on the surface, or when residing between two fibers and in contact with the two fibers, it can bond the two fibers together. Other polymers such as starches can form a film and/or bond the fibers together when the treated fabric is pressed by a hot iron. Such a film will have adhesive strength, cohesive breaking strength, and cohesive breaking strain.

20 Nonlimiting examples for natural polymers are starches and their derivatives, and chitins and their derivatives.

25 The synthetic polymers useful in the present invention are comprised of monomers. Some nonlimiting examples of monomers which can be used to form the synthetic polymers of the present invention include: low molecular weight C<sub>1</sub>-C<sub>6</sub> unsaturated organic mono-carboxylic and polycarboxylic acids, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and mixtures thereof; esters of said acids with C<sub>1</sub>-C<sub>12</sub> alcohols, such as methanol, ethanol, 1-propanol, 2-propanol, 1-butanol, 2-methyl-1-propanol, 1-pentanol, 2-pentanol, 3-pentanol, 2-methyl-1-butanol, 1-methyl-1-butanol, 3-methyl-1-butanol, 1-methyl-1-pentanol, 2-methyl-1-pentanol, 3-methyl-1-pentanol, t-butanol, cyclohexanol, 2-ethyl-1-butanol, neodecanol, 3-heptanol, benzyl alcohol, 2-octanol, 6-methyl-1-heptanol, 2-ethyl-1-

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hexanol, 3,5-dimethyl-1-hexanol, 3,5,5-trimethyl-1-hexanol, 1-decanol, 1-dodecanol, and the like, and mixtures thereof. Nonlimiting examples of said esters are methyl acrylate, ethyl acrylate, t-butyl acrylate, methyl methacrylate, hydroxyethyl methacrylate, methoxy ethyl methacrylate, and mixtures thereof; amides and imides of said acids, such as N,N-dimethylacrylamide, N-t-butyl acrylamide, maleimides; low molecular weight unsaturated alcohols such as vinyl alcohol (produced by the hydrolysis of vinyl acetate after polymerization), allyl alcohol; esters of said alcohols with low molecular weight carboxylic acids, such as, vinyl acetate, vinyl propionate; ethers of said alcohols such as methyl vinyl ether; aromatic vinyl such as styrene, alpha-methylstyrene, t-butylstyrene, vinyl toluene, polystyrene macromer, and the like; polar vinyl heterocyclics, such as vinyl pyrrolidone, vinyl caprolactam, vinyl pyridine, vinyl imidazole, and mixtures thereof; other unsaturated amines and amides, such as vinyl amine, diethylene triamine, dimethylaminoethyl methacrylate, ethenyl formamide; vinyl sulfonate; salts of acids and amines listed above; low molecular weight unsaturated hydrocarbons and derivatives such as ethylene, propylene, butadiene, cyclohexadiene, vinyl chloride; vinylidene chloride; and mixtures thereof and alkyl quaternized derivatives thereof, and mixtures thereof. Preferably, said monomers are selected from the group consisting of vinyl alcohol; acrylic acid; methacrylic acid; methyl acrylate; ethyl acrylate; methyl methacrylate; t-butyl acrylate; t-butyl methacrylate; n-butyl acrylate; n-butyl methacrylate; isobutyl methacrylate; 2-ethylhexyl methacrylate; dimethylaminoethyl methacrylate; N,N-dimethyl acrylamide; N,N-dimethyl methacrylamide; N-t-butyl acrylamide; vinylpyrrolidone; vinyl pyridine; adipic acid; diethylenetriamine; salts thereof and alkyl quaternized derivatives thereof, and mixtures thereof.

Preferably, said monomers form homopolymers and/or copolymers (i.e., the film-forming and/or adhesive polymer) having a glass transition temperature (Tg) of from about -20°C to about 150°C, preferably from about -10°C to about 150°C, more preferably from about 0°C to about 100°C, most preferably, the adhesive polymer hereof, when dried to form a film will have a Tg of at least about 25°C., so that they are not unduly sticky, or "tacky" to the touch. Preferably said polymer is soluble and/or dispersible in water and/or alcohol. Said polymer typically has a molecular weight of at least about 500, preferably from about 1,000 to about 2,000,000, more preferably from about 5,000 to about 1,000,000, and even more preferably from about 30,000 to about 300,000 for some polymers.

Some non-limiting examples of homopolymers and copolymers which can be used as film-forming and/or adhesive polymers of the present invention are: adipic

acid/dimethylaminohydroxypropyl diethylenetriamine copolymer; adipic acid/epoxypropyl diethylenetriamine copolymer; poly(vinylpyrrolidone/dimethylaminoethyl methacrylate); polyvinyl alcohol; polyvinylpyridine n-oxide; methacryloyl ethyl betaine/methacrylates copolymer; ethyl acrylate/methyl methacrylate/methacrylic acid/acrylic acid copolymer; polyamine resins; and polyquaternary amine resins; poly(ethenylformamide); poly(vinylamine) hydrochloride; poly(vinyl alcohol-co-6% vinylamine); poly(vinyl alcohol-co-12% vinylamine); poly(vinyl alcohol-co-6% vinylamine hydrochloride); and poly(vinyl alcohol-co-12% vinylamine hydrochloride). Suitable copolymer and/or homopolymers are selected from the group consisting of adipic acid/dimethylaminohydroxypropyl diethylenetriamine copolymer; poly(vinylpyrrolidone/dimethylaminoethyl methacrylate); polyvinyl alcohol; ethyl acrylate/methyl methacrylate/methacrylic acid/acrylic acid copolymer; methacryloyl ethyl betaine/methacrylates copolymer; polyquaternary amine resins; poly(ethenylformamide); poly(vinylamine) hydrochloride; poly(vinyl alcohol-co-6% vinylamine); poly(vinyl alcohol-co-12% vinylamine); poly(vinyl alcohol-co-6% vinylamine hydrochloride); and poly(vinyl alcohol-co-12% vinylamine hydrochloride).

Nonlimiting examples of the suitable polymer that are commercially available are: polyvinylpyrrolidone/dimethylaminoethyl methacrylate copolymer, such as Copolymer 958<sup>®</sup>, molecular weight of about 100,000 and Copolymer 937, molecular weight of about 1,000,000, available from GAF Chemicals Corporation; adipic acid/dimethylaminohydroxypropyl diethylenetriamine copolymer, such as Cartaretin F-4<sup>®</sup> and F-23, available from Sandoz Chemicals Corporation; methacryloyl ethyl betaine/methacrylates copolymer, such as Diaformer Z-SM<sup>®</sup>, available from Mitsubishi Chemicals Corporation; polyvinyl alcohol copolymer resin, such as Vinex 2019<sup>®</sup>, available from Air Products and Chemicals or Moweol<sup>®</sup>, available from Clariant; adipic acid/epoxypropyl diethylenetriamine copolymer, such as Delsette 101<sup>®</sup>, available from Hercules Incorporated; polyamine resins, such as Cypro 515<sup>®</sup>, available from Cytec Industries; polyquaternary amine resins, such as Kymene 557H<sup>®</sup>, available from Hercules Incorporated; and polyvinylpyrrolidone/acrylic acid, such as Sokalan EG 310<sup>®</sup>, available from BASF.

Preferred polymers useful in the present invention are selected from the group consisting of copolymers of hydrophilic monomers and hydrophobic monomers. The polymer can be linear random or block copolymers, and mixtures thereof. Such hydrophobic/hydrophilic copolymers typically have a hydrophobic monomer/hydrophilic monomer ratio of from about 95:5 to about 20:80, preferably from about 90:10 to about

40:60, more preferably from about 80:20 to about 50:50 by weight of the copolymer. The hydrophobic monomer can comprise a single hydrophobic monomer or a mixture of hydrophobic monomers, and the hydrophilic monomer can comprise a single hydrophilic monomer or a mixture of hydrophilic monomers. The term "hydrophobic" is used herein consistent with its standard meaning of lacking affinity for water, whereas "hydrophilic" is used herein consistent with its standard meaning of having affinity for water. As used herein in relation to monomer units and polymeric materials, including the copolymers, "hydrophobic" means substantially water insoluble; "hydrophilic" means substantially water soluble. In this regard, "substantially water insoluble" shall refer to a material that is not soluble in distilled (or equivalent) water, at 25°C., at a concentration of about 0.2% by weight, and preferably not soluble at about 0.1% by weight (calculated on a water plus monomer or polymer weight basis). "Substantially water soluble" shall refer to a material that is soluble in distilled (or equivalent) water, at 25°C., at a concentration of about 0.2% by weight, and are preferably soluble at about 1% by weight. The terms "soluble", "solubility" and the like, for purposes hereof, corresponds to the maximum concentration of monomer or polymer, as applicable, that can dissolve in water or other solvents to form a homogeneous solution, as is well understood to those skilled in the art.

Nonlimiting examples of useful hydrophobic monomers are acrylic acid C<sub>1</sub>-C<sub>18</sub> alkyl esters, such as methyl acrylate, ethyl acrylate, t-butyl acrylate; methacrylic C<sub>1</sub>-C<sub>18</sub> alkyl esters, such as methyl methacrylate, 2-ethyl hexyl methacrylate, methoxy ethyl methacrylate; vinyl alcohol esters of carboxylic acids, such as, vinyl acetate, vinyl propionate, vinyl neodecanoate; aromatic vinyls, such as styrene, t-butyl styrene, vinyl toluene; vinyl ethers, such as methyl vinyl ether; vinyl chloride; vinylidene chloride; ethylene, propylene and other unsaturated hydrocarbons; and the like; and mixtures thereof. Some preferred hydrophobic monomers are methyl acrylate, methyl methacrylate, t-butyl acrylate, t-butyl methacrylate, n-butyl acrylate, n-butyl methacrylate, and mixtures thereof.

Nonlimiting examples of useful hydrophilic monomers are unsaturated organic mono-carboxylic and polycarboxylic acids, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid; unsaturated alcohols, such as vinyl alcohol, allyl alcohol; polar vinyl heterocyclics, such as vinyl pyrrolidone, vinyl caprolactam, vinyl pyridine, vinyl imidazole; vinyl amine; vinyl sulfonate; unsaturated amides, such as acrylamides, e.g., N,N-dimethylacrylamide, N-t-butyl acrylamide; hydroxyethyl methacrylate; dimethylaminoethyl methacrylate; salts of acids and amines listed above; and the like; and mixtures thereof. Some preferred hydrophilic monomers are acrylic acid, methacrylic acid, N,N-dimethyl acrylamide, N,N-dimethyl

methacrylamide, N-t-butyl acrylamide, dimethylamino ethyl methacrylate, vinyl pyrrolidone, salts thereof and alkyl quaternized derivatives thereof, and mixtures thereof.

Non limiting examples of polymers for use in the present invention include the following, where the composition of the copolymer is given as approximate weight percentage of each monomer used in the polymerization reaction used to prepare the polymer: vinyl pyrrolidone/vinyl acetate copolymers (at ratios of up to about 30% by weight of vinyl pyrrolidone); dimethyl acrylamide/ t-butyl acrylate/ethyl hexyl methacrylate copolymer (10/45/45); vinyl pyrrolidone/vinyl acetate/butyl acrylate copolymer (10/78/12 and 10/70/20); vinyl pyrrolidone/vinyl propionate copolymer (5/95); vinyl caprolactam/vinyl acetate copolymer (5/95); acrylic acid/t-butyl acrylate (25/75) and styling resins sold under the trade names Ultrahold CA 8<sup>®</sup> by Ciba Geigy (ethyl acrylate/ acrylic acid/N-t-butyl acrylamide copolymer); Resyn 28-1310<sup>®</sup> by National Starch and Luviset CA 66<sup>®</sup> by BASF (vinyl acetate/crotonic acid copolymer 90/10); Luviset CAP<sup>®</sup> by BASF (vinyl acetate/vinyl propionate/crotonic acid 50/40/10); Resyn 28-2930<sup>®</sup> by National Starch (vinyl acetate/vinyl neodecanoate/crotonic acid copolymer), Amerhold DR-25<sup>®</sup> by Union Carbide (ethyl acrylate/methacrylic acid/methyl methacrylate/acrylic acid copolymer), and Poligen A<sup>®</sup> by BASF (polyacrylate dispersion) and acrylates copolymers such as Luviflex<sup>TM</sup>Soft, Luvimer<sup>®</sup> 100P, Luvimer<sup>®</sup> 30E, Luvimer<sup>®</sup> 36D.

Preferably, the shape retention polymers contain an effective amount of monomers having carboxylic groups to control amine odor. Highly preferred shape retention copolymers contain hydrophobic monomers and hydrophilic monomers which comprise unsaturated organic mono-carboxylic and polycarboxylic acid monomers, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and salts thereof, and mixtures thereof; and optionally other hydrophilic monomers. These preferred polymers of the current invention surprisingly provide control of certain amine type malodors in fabrics, in addition to providing the fabric wrinkle control benefit. Examples of the hydrophilic unsaturated organic mono-carboxylic and polycarboxylic acid monomers are acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and mixtures thereof. Nonlimiting examples of the hydrophobic monomers are esters of the unsaturated organic mono-carboxylic and polycarboxylic acids cited hereinabove with C1-C12 alcohols, such as methanol, ethanol, 1-propanol, 2-propanol, 1-butanol, 2-methyl-1-propanol, 1-pentanol, 2-pentanol, 3-pentanol, 2-methyl-1-butanol, 1-methyl-1-butanol, 3-methyl-1-butanol, 1-methyl-1-pentanol, 2-methyl-1-pentanol, 3-methyl-1-pentanol, t-butanol, cyclohexanol, 2-ethyl-1-

butanol, and mixtures thereof, preferably methanol, ethanol, 1-propanol, 2-propanol, 1-butanol, 2-methyl-1-propanol, t-butanol, and mixtures thereof. One highly preferred copolymer contains acrylic acid and t-butyl acrylate monomeric units, preferably with acrylic acid/t-butyl acrylate ratios of from about 90:10 to about 10:90, preferably from about 70:30 to about 15:85, more preferably from about 40:60 to about 20:80. Nonlimiting examples of acrylic acid/tert-butyl acrylate copolymers useful in the present invention are those typically with a molecular weight of from about 1,000 to about 2,000,000, preferably from about 5,000 to about 1,000,000, and more preferably from about 30,000 to about 300,000, and with an approximate acrylic acid/tert-butyl acrylate weight ratio of about 25:75 and an average molecular weight of from about 70,000 to about 100,000, and those with an approximate acrylic acid/tert-butyl acrylate weight ratio of about 35:65 and an average molecular weight of from about 60,000 to about 90,000. Compositions containing these polymers also can additionally comprise perfume, antibacterial active, odor control agent, static control agent, and mixtures thereof.

15 The film-forming and/or adhesive polymer of the present invention is present at least an effective amount to provide shape retention, typically from about 0.05% to about 10%, preferably from about 0.1% to about 5%, more preferably from about 0.2% to about 3%, even more preferably from about 0.3% to about 1.5%, by weight of the usage composition.

20 The adhesive polymer is present in the composition in a sufficient amount to result in an amount of from about 0.001% to about 1%, preferably from about 0.01% to about 0.5%, more preferably from about 0.02% to about 0.4% by weight of polymer per weight of dry fabrics.

25 It is not intended to exclude the use of higher or lower levels of the polymers, as long as an effective amount is used to provide adhesive and film-forming properties to the composition and the composition can be formulated and effectively applied for its intended purpose.

30 Silicones and film-forming polymers can be combined to produce preferred wrinkle reducing actives. Typically the weight ratio of silicone to film-forming polymer is from about 10:1 to about 1:10, preferably from about 5: 1 to about 1:5, and more preferably from about 3:1 to about 1:3 and even more preferably from about 2:1 to about 1:2. Typically, the preferred wrinkle reducing active of silicone plus polymer is present at a level of from about 0.1% to about 8%, preferably from about 0.3% to about 5%, more preferably from about 0.5% to about 3%, by weight of the composition.

Preferred adhesive and/or film forming polymers that are useful in the composition of the present invention actually contain silicone moieties in the polymers themselves. These preferred polymers include graft and block copolymers of silicone with moieties containing hydrophilic and/or hydrophobic monomers described hereinbefore. The silicone-containing copolymers in the spray composition of the present invention provide shape retention, body, and/or good, soft fabric feel. Preferred silicone-containing copolymers contain hydrophobic monomers and hydrophilic monomers which comprise unsaturated organic mono-carboxylic and/or polycarboxylic acid monomers, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and salts thereof, and mixtures thereof; and optionally other hydrophilic monomers. These preferred polymers of the current invention provide control of certain amine type malodors in fabrics, in addition to providing the fabric wrinkle control benefit.

Both silicone-containing graft and block copolymers useful in the present invention have the following properties:

- (1) the silicone portion is covalently attached to the non-silicone portion;
- (2) the molecular weight of the silicone portion is from about 1,000 to about 50,000; and
- (3) the non-silicone portion must render the entire copolymer soluble or dispersible in the wrinkle control composition vehicle and permit the copolymer to deposit on/adhere to the treated fabrics.

Suitable silicone copolymers include the following:

**a) Silicone Graft Copolymers**

Preferred silicone-containing polymers are the silicone graft copolymers comprising acrylate groups described, along with methods of making them, in U.S. Patent No. 5,658,557, Bolich et al., issued Aug. 19, 1997, U.S. Patent No. 4,693,935, Mazurek, issued Sept. 15, 1987, and U.S. Patent No. 4,728,571, Clemens et al., issued Mar. 1, 1988. Additional silicone-containing polymers are disclosed in U.S. Pat. Nos. 5,480,634, Hayama et al, issued Oct. 2, 1996, 5,166,276, Hayama et al., issued Nov. 24, 1992, 5,061,481, issued Oct. 29, 1991, Suzuki et al., 5,106,609, Bolich et al., issued Apr. 21, 1992, 5,100,658, Bolich et al., issued Mar. 31, 1992, 5,100,657, Ansher-Jackson, et al., issued Mar. 31, 1992, 5,104,646, Bolich et al., issued Apr. 14, 1992, all of which are incorporated herein by reference.

These polymers preferably include copolymers having a vinyl polymeric backbone having grafted onto it monovalent siloxane polymeric moieties, and components consisting of non-silicone hydrophilic and hydrophobic monomers.

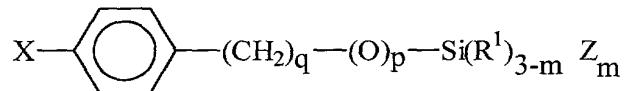
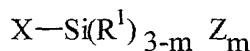
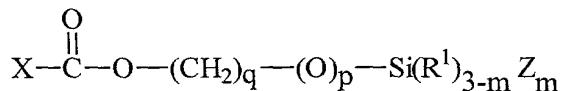
The silicone-containing monomers are exemplified by the general formula:



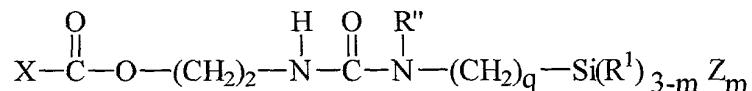
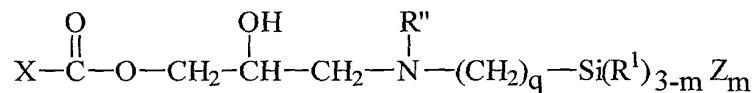
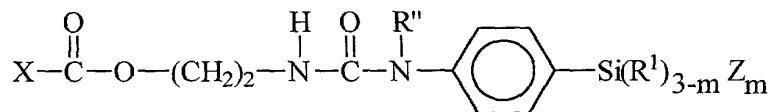
wherein X is a polymerizable group, such as a vinyl group, which is part of the backbone of the polymer; Y is a divalent linking group; R is a hydrogen, hydroxyl, lower alkyl (e.g. C<sub>1</sub>-C<sub>4</sub>), aryl, alkaryl, alkoxy, or alkylamino; Z is a monovalent polymeric siloxane moiety having an average molecular weight of at least about 500, is essentially unreactive under copolymerization conditions, and is pendant from the vinyl polymeric backbone described above; n is 0 or 1; and m is an integer from 1 to 3.

The preferred silicone-containing monomer has a weight average molecular weight of from about 1,000 to about 50,000, preferably from about 3,000 to about 40,000, most preferably from about 5,000 to about 20,000.

Nonlimiting examples of preferred silicone-containing monomers have the following formulas:

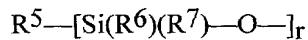


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In these structures m is an integer from 1 to 3, preferably 1; p is 0 or 1; q is an integer from 2 to 6; n is an integer from 0 to 4, preferably 0 or 1, more preferably 0; R<sup>1</sup> is

hydrogen, lower alkyl, alkoxy, hydroxyl, aryl, alkylamino, preferably R<sup>1</sup> is alkyl; R" is alkyl or hydrogen; X is CH(R<sup>3</sup>)=C(R<sup>4</sup>)-; R<sup>3</sup> is hydrogen or -COOH, preferably hydrogen; R<sup>4</sup> is hydrogen, methyl or -CH<sub>2</sub>COOH, preferably methyl; Z is



5 wherein R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup>, independently are lower alkyl, alkoxy, alkylamino, hydrogen or hydroxyl, preferably alkyl; and r is an integer of from about 5 to about 700, preferably from about 60 to about 400, more preferably from about 100 to about 300. Most preferably, R<sup>5</sup>, R<sup>6</sup>, and R<sup>7</sup> are methyl, p = 0, and q = 3.

10 Silicone-containing adhesive and/or film-forming copolymers useful in the present invention comprise from 0% to about 90%, preferably from about 10% to about 80%, more preferably from about 40% to about 75% of hydrophobic monomer, from about 0% to about 90%, preferably from about 5% to about 80% of hydrophilic monomer, and from about 5% to about 50%, preferably from about 10% to about 40%, more preferably from about 15% to about 25% of silicone-containing monomer.

15 The composition of any particular copolymer will help determine its formulation properties. In fact, by appropriate selection and combination of particular hydrophobic, hydrophilic and silicone-containing components, the copolymer can be optimized for inclusion in specific vehicles. For example, polymers which are soluble in an aqueous formulation preferably contain from 0% to about 70%, preferably from about 5% to about 70% of hydrophobic monomer, and from about 30% to about 98%, preferably from about 30% to about 80%, of hydrophilic monomer, and from about 1% to about 40% of silicone-containing monomer. Polymers which are dispersible preferably contain from 0% to about 70%, more preferably from about 5% to about 70%, of hydrophobic monomer, and from about 20% to about 80%, more preferably from about 20% to about 60%, of hydrophilic monomer, and from about 1% to about 40% of silicone-containing monomer.

20 The silicone-containing copolymers preferably have a weight average molecular weight of from about 10,000 to about 1,000,000, preferably from about 30,000 to about 300,000.

25 The preferred polymers comprise a vinyl polymeric backbone, preferably having a Tg or a Tm as defined above of about -20°C. and, grafted to the backbone, a polydimethylsiloxane macromer having a weight average molecular weight of from about

1,000 to about 50,000, preferably from about 5,000 to about 40,000, most preferably from about 7,000 to about 20,000. The polymer is such that when it is formulated into the finished composition, and then dried, the polymer phase separates into a discontinuous phase which includes the polydimethylsiloxane macromer and a continuous phase which includes the backbone. Exemplary silicone grafted polymers for use in the present invention include the following, where the composition of the copolymer is given with the approximate weight percentage of each monomer used in the polymerization reaction to prepare the copolymer: N,N-dimethylacrylamide/isobutyl methacrylate/(PDMS macromer - 20,000 approximate molecular weight) (20/60/20 w/w/w), copolymer of average molecular weight of about 400,000; N,N-dimethylacrylamide/(PDMS macromer -20,000 approximate molecular weight) (80/20 w/w), copolymer of average molecular weight of about 300,000; t-butylacrylate/N,N-dimethylacrylamide/(PDMS macromer - 10,000 approximate molecular weight) (70/10/20), copolymer of average molecular weight of about 400,000; and (N,N,N-trimethylammonioethylmethacrylate chloride)/N,N-dimethylacrylamide/(PDMS macromer - 15,000 approximate molecular weight) (40/40/20), copolymer of average molecular weight of about 150,000.

Highly preferred shape retention copolymers of this type contain hydrophobic monomers, silicone-containing monomers and hydrophilic monomers which comprise unsaturated organic mono- and polycarboxylic acid monomers, such as acrylic acid, methacrylic acid, crotonic acid, maleic acid and its half esters, itaconic acid, and salts thereof, and mixtures thereof. These preferred polymers surprisingly provide control of certain amine type malodors in fabrics, in addition to providing the fabric wrinkle control benefit. A nonlimiting example of such copolymer is n-butylmethacrylate /acrylic acid/(polydimethylsiloxane macromer, 20,000 approximate molecular weight) copolymer of average molecular weight of about 100,000, and with an approximate monomer weight ratio of about 70/10/20. A highly preferred copolymer is composed of acrylic acid, t-butyl acrylate and silicone-containing monomeric units, preferably with from about 20% to about 90%, preferably from about 30% to about 80%, more preferably from about 50% to about 75% t-butyl acrylate; from about 5% to about 60%, preferably from about 8% to about 45%, more preferably from about 10% to about 30% of acrylic acid; and from about 5% to about 50%, preferably from about 10% to about 40%, more preferably from about 15% to about 30% of polydimethylsiloxane of an average molecular weight of from about 1,000 to about 50,000, preferably from about 5,000 to about 40,000, most preferably from about 7,000 to about 20,000. Nonlimiting examples of acrylic acid/tert-butyl acrylate/polydimethyl siloxane macromer copolymers useful in the present

invention, with approximate monomer weight ratio, are: t-butylacrylate/acrylic acid/(polydimethylsiloxane macromer, 10,000 approximate molecular weight) (70/10/20 w/w/w), copolymer of average molecular weight of about 300,000; t-butylacrylate/acrylic acid/(polydimethylsiloxane macromer, 10,000 approximate molecular weight) (65/25/10 w/w/w), copolymer of average molecular weight of about 200,000; t-butyl acrylate/acrylic acid/(polydimethylsiloxane macromer, 10,000 approximate molecular weight) (63/20/17), copolymer of average molecular weight of from about 120,000 to about 150,000; and n-butylmethacrylate/acrylic acid/ (polydimethylsiloxane macromer - 20,000 approximate molecular weight) (70/10/20 w/w/w), copolymer of average molecular weight of about 100,000. A useful and commercially available copolymer of this type is Diahold® ME from Mitsubishi Chemical Corp., which is a t-butyl acrylate/acrylic acid/ (polydimethylsiloxane macromer, 12,000 approximate molecular weight) (60/20/20), copolymer of average molecular weight of about 128,000.

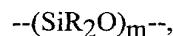
**b) Silicone Block Copolymers**

Also useful herein are silicone block copolymers comprising repeating block units of polysiloxanes.

Examples of silicone-containing block copolymers are found in U.S. Patent No. 5,523,365, to Geck et al., issued June 4, 1996; U.S. Patent No. 4,689,289, to Crivello, issued Aug. 25, 1987; U.S. Patent No. 4,584,356, to Crivello, issued April 22, 1986; *Macromolecular Design, Concept & Practice*, Ed: M. K. Mishra, Polymer Frontiers International, Inc., Hopewell Jct., NY (1994), and *Block Copolymers*, A. Noshay and J. E. McGrath, Academic Press, NY (1977), which are all incorporated by reference herein in their entirety. Other silicone block copolymers suitable for use herein are those described, along with methods of making them, in the above referenced and incorporated U.S. Patent No. 5,658,577.

The silicone-containing block copolymers useful in the present invention can be described by the formulas A-B, A-B-A, and -(A-B)<sub>n</sub>- wherein n is an integer of 2 or greater. A-B represents a diblock structure, A-B-A represents a triblock structure, and -(A-B)<sub>n</sub>- represents a multiblock structure. The block copolymers can comprise mixtures of diblocks, triblocks, and higher multiblock combinations as well as small amounts of homopolymers.

The silicone block portion, B, can be represented by the following polymeric structure



wherein each R is independently selected from the group consisting of hydrogen, hydroxyl, C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> alkoxy, C<sub>2</sub>-C<sub>6</sub> alkylamino, styryl, phenyl, C<sub>1</sub>-C<sub>6</sub> alkyl or

alkoxy-substituted phenyl, preferably methyl; and  $m$  is an integer of about 10 or greater, preferably of about 40 or greater, more preferably of about 60 or greater, and most preferably of about 100 or greater.

5 The non-silicone block, A, comprises monomers selected from the monomers as described hereinabove in reference to the non-silicone hydrophilic and hydrophobic monomers for the silicone grafted copolymers. Vinyl blocks are preferred co-monomers. The block copolymers preferably contain one or more non-silicone blocks, and up to about 50%, preferably from about 10% to about 20%, by weight of one or more polydimethyl siloxane blocks.

10 **c) Sulfur-Linked Silicone-Containing Copolymers**

Also useful herein are sulfur-linked silicone containing copolymers, including block copolymers. As used herein in reference to silicone containing copolymers, the term "sulfur-linked" means that the copolymer contains a sulfur linkage (i.e., -S-), a disulfide linkage (i.e., -S-S-), or a sulfhydryl group (i.e., -SH).

15 These sulfur-linked silicone-containing copolymers are represented by the following general formula:

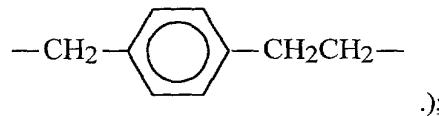
20 wherein each  $G_5$  and  $G_6$  is independently selected from the group consisting of alkyl, aryl, alkaryl, alkoxy, alkylamino, fluoroalkyl, hydrogen, and  $-ZSA$ , wherein A represents a vinyl polymeric segment consisting essentially of polymerized free radically polymerizable monomer, and Z is a divalent linking group (Useful divalent linking groups Z include but are not limited to the following:  $C_1$  to  $C_{10}$  alkylene, alkarylene, arylene, and alkoxyalkylene. Preferably, Z is selected from the group consisting of methylene and propylene for reasons of commercial availability.);

25 each  $G_2$  comprises A;

each  $G_4$  comprises A;

30 each  $R_1$  is a monovalent moiety selected from the group consisting of alkyl, aryl, alkaryl, alkoxy, alkylamino, fluoroalkyl, hydrogen, and hydroxyl (Preferably,  $R_1$  represents monovalent moieties which can independently be the same or different selected from the group consisting of  $C_{1-4}$  alkyl and hydroxyl for reasons of commercial availability. Most preferably,  $R_1$  is methyl.);

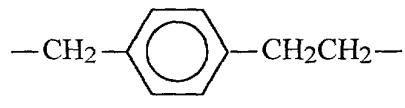
35 each  $R_2$  is a divalent linking group (Suitable divalent linking groups include but are not limited to the following:  $C_1$  to  $C_{10}$  alkylene, arylene, alkarylene, and alkoxyalkylene. Preferably,  $R_2$  is selected from the group consisting of  $C_{1-3}$  alkylene and  $C_{7-C_{10}}$  alkarylene due to ease of synthesis of the compound. Most preferably,  $R_2$  is selected from the group consisting of  $-CH_2-$ , 1,3-propylene, and



.);

each R<sub>3</sub> represents monovalent moieties which can independently be the same or different and are selected from the group consisting of alkyl, aryl, alkaryl, alkoxy, alkylamino, fluoroalkyl, hydrogen, and hydroxyl (Preferably, R<sub>3</sub> represents monovalent moieties which can independently be the same or different selected from the group consisting of C<sub>1-4</sub> alkyl and hydroxyl for reasons of commercial availability. Most preferably, R<sub>3</sub> is methyl.);

each R<sub>4</sub> is a divalent linking group (Suitable divalent linking groups include but are not limited to the following: C<sub>1</sub> to C<sub>10</sub> alkylene, arylene, alkarylene, and alkoxyalkylene. Preferably, R<sub>4</sub> is selected from the group consisting of C<sub>1-3</sub> alkylene and C<sub>7-C10</sub> alkarylene for ease of synthesis. Most preferably, R<sub>4</sub> is selected from the group consisting of —CH<sub>2</sub>—, 1,3-propylene, and



.);

x is an integer of 0-3; y is an integer of 5 or greater (preferably y is an integer ranging from about 14 to about 700, preferably from about 20 to about 200); and q is an integer of 0-3; wherein at least one of the following is true:

- q is an integer of at least 1;
- x is an integer of at least 1;
- G<sub>5</sub> comprises at least one —ZSA moiety; or
- G<sub>6</sub> comprises at least one —ZSA moiety.

As noted above, A is a vinyl polymeric segment formed from polymerized free radically polymerizable monomers. The selection of A is typically based upon the intended uses of the composition, and the properties the copolymer must possess in order to accomplish its intended purpose. If A comprises a block in the case of block copolymers, a polymer having AB and/or ABA architecture will be obtained depending upon whether a mercapto functional group —SH is attached to one or both terminal silicon atoms of the mercapto functional silicone compounds, respectively. The weight ratio of vinyl polymer block or segment, to silicone segment of the copolymer can vary. The preferred copolymers are those wherein the weight ratio of vinyl polymer segment to silicone segment ranges from about 98:2 to 50:50, in order that the copolymer possesses properties inherent to each of the different polymeric segments while retaining the overall polymer's solubility.

Sulfur linked silicone copolymers are described in more detail in U.S. Patent No. 5,468,477, to Kumar et al., issued November 21, 1995, and PCT Application No. WO 95/03776, assigned to 3M, published February 9, 1995, which are incorporated by reference herein in their entirety.

5 Other useful silicone-containing polymers are those containing hydrophilic portions, such as polyvinylpyrrolidone/quaternaries, polyacrylates, polyacrylamides, polysulfonates, and mixtures thereof, and are disclosed, e.g., in U.S. Pat. No. 5,120,812, incorporated herein by reference.

10 The film-forming and/or adhesive silicone-containing copolymer of the present invention is present at least an effective amount to provide shape retention, typically from about 0.05% to about 10%, preferably from about 0.1% to about 5%, more preferably from about 0.2% to about 3%, even more preferably from about 0.3% to about 1.5%, by weight of the usage composition.

15 The silicone-containing copolymer is present in the composition in a sufficient amount to result in an amount of from about 0.001% to about 1%, preferably from about 0.01% to about 0.5%, more preferably from about 0.02% to about 0.4% by weight of polymer per weight of dry fabrics.

20 When the optional cyclodextrin is present in the composition, the polymer useful in providing shape retention in the composition of the present invention should be cyclodextrin-compatible, that is it should not substantially form complexes with cyclodextrin so as to diminish performance of the cyclodextrin and/or the polymer. Complex formation affects both the ability of the cyclodextrin to absorb odors and the ability of the polymer to impart shape retention to fabric. In this case, the monomers having pendant groups that can complex with cyclodextrin are not preferred because they can form complexes with cyclodextrin. Examples of such monomers are acrylic or methacrylic acid esters of C<sub>7</sub>-C<sub>18</sub> alcohols, such as neodecanol, 3-heptanol, benzyl alcohol, 2-octanol, 6-methyl-1-heptanol, 2-ethyl-1-hexanol, 3,5-dimethyl-1-hexanol, 3,5,5-trimethyl-1-hexanol, and 1-decanol; aromatic vinyls, such as styrene; t-butylstyrene; vinyl toluene; and the like.

25

30 **d) Starch**

35 For some aspects of the composition, e.g. when it is desirable for the fabric to have substantial movement (often referred to as drape or flow), starch is not normally preferred, since it makes the fabric scratchy and resistant to deformation. However, starch does provide increased "body" which is desirable and preferred for some aspects of the present invention. Starch is particularly preferred in compositions of this invention to be used on fabrics that require body and in compositions to be used with ironing. When

used, starch is solubilized or dispersed in the composition. Any type of starch, e.g. those derived from corn, wheat, rice, grain sorghum, waxy grain sorghum, waxy maize or tapioca, or mixtures thereof and water soluble or dispersible modifications or derivatives thereof, can be used in the composition of the present invention. Modified starches that can be used include natural starches that have been degraded to obtain a lower viscosity by acidic, oxidative or enzymatic depolymerization. Additionally, low viscosity commercially available propoxylated and/or ethoxylated starches are useable in the present composition and are preferred since their low viscosity at relatively high solids concentrations make them very adaptable to spraying processes. Suitable alkoxylation, 5 low viscosity starches are submicron sized particles of hydrophobic starch that are readily dispersed in water and are prepared by alkoxylation of granular starch with a monofunctional alkoxylation agent which provides the starch with ether linked hydrophilic groups. A suitable method for their preparation is taught in U.S. Pat. No. 10 3,462,283. In accordance with the invention, the propoxylated or ethoxylated starch derivatives are dispersed in the aqueous medium in an amount of from about 0.1% to 15 about 10%, preferably from about 0.5% to about 6%, more preferably from about 1% to about 4% by weight of the usage composition.

### **3. LITHIUM SALTS**

Lithium salts are disclosed as solubilizing aids, e.g., lithium bromide in the 20 production of silk fibroin, (U.S. Pat. No. 4,233,212, issued Nov. 11, 1980 to Otoi et al.), and lithium thiocyanate, (U.S. Pat. No. 5,252,285, issued Oct. 12, 1993 to Robert L. Lock). U.S. Pat. No. 5,296,269, issued Mar. 22, 1994 to Yang et al. discloses a process to produce crease-resistant silk using lithium bromide and lithium chloride. U.S. Pat. No. 25 5,199,954, issued Apr. 6, 1993 to Schultz et al. discloses a hair dye composition containing lithium bromide. U.S. Pat. No. 5,609,859, issued Mar. 11, 1997 to D. R. Cowsar discloses methods for preparing hair relaxer creams containing a lithium salt. Lithium salts are disclosed as static control agents in a liquid softener composition in U.S. Pat. No. 4,069,159, issued Jan. 17, 1978 to Mason Hayek. All of these patents are incorporated herein by reference.

30 It is now found that aqueous compositions comprising lithium salts provide improved fabric wrinkle control. Nonlimiting examples of lithium salts that are useful in the present invention are lithium bromide, lithium chloride, lithium lactate, lithium benzoate, lithium acetate, lithium sulfate, lithium tartrate, and/or lithium bitartrate, preferably lithium bromide and/or lithium lactate. Some water soluble salts such as , lithium benzoate are not preferred when the optional cyclodextrin is present because they 35 can form complexes with cyclodextrin. Useful levels of lithium salts are from about

0.1% to about 10%, preferably from about 0.5% to about 7%, more preferably from about 1% to about 5%, by weight of the usage composition.

#### **4. FABRIC CARE POLYSACCHARIDES**

##### **a) Primary Fabric Care Polysaccharide**

5 Suitable fabric care polysaccharides for use in the fabric care composition of the present invention are those which have a globular conformation in dilute aqueous solution, via a random coiling structure. Said polysaccharides include homo- and/or hetero- polysaccharides with simple helical structure with or without branching, e.g., with 1,4- $\alpha$ -linked backbone structure (e.g., 1,4- $\alpha$ -glucan, 1,4- $\alpha$ -xylan) with or without branching, 1,3- $\beta$ -linked backbone with or without branching (e.g., galactan), and all 1,6-linked backbones with or without branching (e.g., dextran, pullulan, pustulan), and with a weight-average molecular weight of from about 5,000 to about 500,000, preferably from about 8,000 to about 250,000, more preferably from about 10,000 to about 150,000, typically with sizes ranging from about 2 nm to about 300 nm, preferably from about 3 nm to about 100 nm, more preferably from about 4 nm to about 30 nm. The size is defined as the gyration length occupied by the molecule in dilute aqueous solutions.

10 Preferably the fabric care polysaccharide is selected from the group consisting of arabinogalactan, pachyman, curdlan, callose, paramylon, sceleroglucan, lentinan, lichenan, laminarin, szhizophyllan, grifolan, sclerotinia sclerotiorum glucan (SSG), Ompharia lapidescence glucan (OL-2), pustulan, dextran, pullulan, substituted versions thereof, derivatised versions thereof, and mixtures thereof. More preferably the fabric care polysaccharide is selected from the group consisting of arabinogalactan, dextran, curdlan, substituted versions thereof, derivatised versions thereof, and mixtures thereof, and even more preferably the fabric care polysaccharide comprises arabinogalactan, substituted versions thereof, derivatised versions thereof, and mixtures thereof. Substituted and/or derivatised materials of the fabric care polysaccharides listed hereinabove are also preferred in the present invention. Nonlimiting examples of these materials include: carboxyl and hydroxymethyl substitutions (e.g., some uronic acid instead of neutral sugar units); amino polysaccharides (amine substitution); cationic quaternized polysaccharides; C<sub>1</sub>-C<sub>18</sub> alkylated polysaccharides; acetylated polysaccharide ethers; polysaccharides having amino acid residues attached (small fragments of glycoprotein); polysaccharides containing silicone moieties, and the like. Some hydrophobic derivatives of the polysaccharides help the polysaccharides maintaining the globular conformation.

A preferred class of fabric care polysaccharides suitable for use in the present invention include those that have the backbone comprising at least some, but preferably almost entirely of 1,3- $\beta$ -glycosidic linkages, preferably branched, preferably with either side chains attached with 1,6-linkages or derivatised for better water solubility and/or to maintain the globular structure. The 1,6-linked branched polysaccharides with 1,3- $\beta$ -linked backbone have higher water solubility and/or dispersibility than the non-branched polysaccharides, so that branched polysaccharides can be used at higher molecular weight ranges. Inserting other types of linkages, such as some 1,4- $\beta$  linkages in the 1,3- $\beta$ -linked backbone also improves the solubility of the polysaccharides. Nonlimiting examples of useful fabric care polysaccharides with 1,3- $\beta$ -linked backbone include arabinogalactan, pachymann, curdlan, callose, paramylon, sceleroglucan, lentinan, lichenan, laminarin, schizophyllan, grifolan, sclerotinia sclerotiorum glucan (SSG), Ompharia lapidescence glucan (OL-2), and mixtures thereof. Low molecular weight materials are preferred for polysaccharides with less or no branching, such as curdlan, while higher molecular weight materials for highly branched polysaccharides, such as arabinogalactan, can be used. Higher molecular weight polysaccharides with mixed 1,3- $\beta$  and 1,4- $\beta$  linkages, such as lichenan, can also be used.

A preferred fabric care branched polysaccharide with 1,3- $\beta$ -linked backbone is arabinogalactan (also named as galactoarabinan or epsilon-galactan). Arabinogalactans are long, densely branched high-molecular weight polysaccharides. Arabinogalactan that is useful in the composition of the present invention has a molecular weight range of from about 5,000 to about 500,000, preferably from about 6,000 to about 250,000, more preferably from about 10,000 to about 150,000. These polysaccharides are highly branched, consisting of a galactan backbone with side-chains of galactose and arabinose units (consisting of  $\beta$ -galactopyranose,  $\beta$ -arabinofuranose, and  $\beta$ -arabinopyranose). The major source of arabinogalactan is the larch tree. The genus *Larix* (larches) is common throughout the world. Two main sources of larch trees are western larch (*Larix occidentalis*) in Western North America and Mongolian larch (*Larix dahurica*). Examples of other larches are eastern larch (*Larix laricina*) in eastern North America, European larch (*Larix decidua*), Japanese larch (*Larix leptolepis*), and Siberian larch (*Larix siberica*). Most commercial arabinogalactan is produced from western larch, through a counter-current extraction process. Larch arabinogalactan is water soluble and is composed of arabinose and galactose units in about a 1:6 ratio, with a trace of uronic acid. Glycosyl linkage analysis of larch arabinogalactan is consistent with a highly branched structure comprising a backbone of 1,3- $\beta$ -linked galactopyranose connected by

1,3- $\beta$ -glycosidic linkages, comprised of 3,4,6-, 3,6-, and 3,4- as well as 3-linked residues. The molecular weights of the preferred fractions of larch arabinogalactan include one fraction in the range of from about 14,000 to about 22,000, mainly from about 16,000 to about 21,000, and the other in the range of from about 60,000 to about 500,000, mainly from about 80,000 to about 120,000. The fraction that has the average molecular weight of from about 16,000 to about 20,000 is highly preferred for use in direct applications to fabric, such as in spray-on products. The high molecular weight fraction (of about 100,000 molecular weight), as well as the low molecular weight fraction are suitable for use in processes that involve subsequent water treatments, such as, pre-soak, wash-added and/or rinse-added laundry processes and products. High grade larch arabinogalactan is composed of greater than about 98% arabinogalactan. Larch arabinogalactan and some of its derivatives, such as cationic derivatives are commercially available from Larex, Inc., St Paul, Minnesota.

Arabinogalactans are also present as minor, water-soluble components of softwoods such as hemlock, black spruce, parana pine, mugo pine, Douglas fir, incense cedar, juniper, and the sapwood of sugar maple. Many edible and inedible plants are also rich sources of arabinogalactans, mostly in glycoprotein form, bound to a protein spine of either threonine, proline, or serine ("arabinogalactan-protein"). These plants include leek seeds, carrots, radish, black gram beans, pear, maize, wheat, red wine, Italian ryegrass, tomatoes, ragweed, sorghum, bamboo grass, and coconut meat and milk. Many herbs with well established immune-enhancing properties, such as *Echinacea purpurea*, *Baptisia tinctoria*, *Thuja occidentalis*, *Angelica acutiloba*, and *Curcuma longa* contain significant amounts of arabinogalactans. Small quantities of arabinogalactans also occur in other plants, such as, green coffee bean (sugar ratio about 2:5), centrosema seeds (sugar ratio about 1:13), and wheat flour (sugar ratio about 7:3). About 70% of the water solubles from soybean flour is an arabinogalactan with a sugar ratio of about 1:2.

Examples of other fabric care polysaccharides that have 1,3- $\beta$ -linkage as a part of the backbone include: 1,3- $\beta$ -xylan (from, e.g., *Pencillius dumetosus*), curdlan, a 1,3- $\beta$ -glucan (from e.g., *Alcaligenes faecalis*), paramylon B, a 1,3- $\beta$ -glucan (from, e.g., *Euglena gracilis*), lichenin, a (1,3),(1,4)- $\beta$ -glucan (from various sources including *Cetraria islandica*), sceleroglucan, a (1,3),(1,6)- $\beta$ -glucan (from, e.g., *Sclerotium rolfsii*), and lentinen, a (1,3),(1,6)- $\beta$ -glucan (from, e.g., *Lentinus edodes*). More details about these and other polysaccharides with 1,3- $\beta$ -linked backbone are given in "Chemistry and Biology of (1 $\rightarrow$ 3)- $\beta$ -Glucans", B. A. Stone and A. E. Clarke, La Trobe University Press, Victoria, Australia, 1992, pp. 68-71, and 82-83, incorporated herein by reference.

Substituted and/or derivatised materials of arabinogalactans are also preferred in the present invention. Nonlimiting examples of these materials include: carboxyl and hydroxymethyl substitutions (e.g., some uronic acid instead of neutral sugar units); amino polysaccharides (amine substitution); cationic quaternized polysaccharides; C1-C18 alkylated polysaccharides; acetylated polysaccharide ethers; polysaccharides having amino acid residues attached (small fragments of glycoprotein); polysaccharides containing silicone moieties. These substituted and/or derivatised polysaccharides can provide additional benefits, such as: amine substitution can bind and/or condense with oxidatively damaged regions of the fiber to rejuvenate aged fabrics; acetylated sugar ethers can serve as bleach activators in subsequent processes where hydrogen peroxide is present; polysaccharides having amino acid residues can improve delivery of fabric care benefits for fabrics containing proteinaceous fibers, e.g., wool and silk; and silicone-derivatised polysaccharides can provide additional fabric softness and lubricity. Examples of derivatised arabinogalactan include the 3-chloro-2-hydroxypropyltrimethyl ammonium chloride derivative, available from Larex, Inc and the arabinogalactan-proteins given hereinabove.

The 1,3- $\beta$ -linked backbone of the fabric care polysaccharides of the present invention (as in 1,3- $\beta$ -galactans, 1,3- $\beta$ -D-mannans, 1,3- $\beta$ -D-xylans and 1,3- $\beta$ -D-glucans) has a pseudohelical conformation. As such, these polysaccharides have a backbone chain that is flexible and in aqueous solution, has a tendency to coil into a globular structure to substantially reduce their apparent dimension (gyration volume), as opposed to the backbone chain of 1,4- $\beta$ -glucan which has an extended dimension. The polysaccharides with 1,3- $\beta$ -linked backbone and extensive branching via 1,6-linkages, or polysaccharides with helical confirmation or polysaccharides with 1,6-linked backbone have added flexibility due to the "coiling" nature of the 1,6-linkages. In water these polysaccharides with 1,3- $\beta$ -linked backbone and 1,6-branching, e.g., arabinogalactans, have a globular conformation with high flexibility to coil into compact, flexible and deformable microscopic particles. For example, an arabinogalactan having a nominal molecular weight of about 18,000 has a size (gyration length) of only from 5 nm to about 10 nm in dilute aqueous solutions. This structural feature of the globular polysaccharides with helical conformation and random coiling nature improves physical properties such as water-solubility, low viscosity and emulsification. Not to be bound by theory is believed that the globular, compact and flexible structural property and low viscosity of the fabric care polysaccharides with 1,3- $\beta$ -linked backbone of the present invention, such as arabinogalactans, is important for providing the fabric care benefits, either via efficient deposition of the polysaccharide globules on the rough fabric surface or via appropriate

fitting/filling of these globules in the openings and/or defective spaces on the fabric fiber surface, where they can orient itself to conform to the space available. Furthermore, it is believed that at low levels, these low molecular weight (about 10,000 to about 150,000) polysaccharide globules of the present invention can very effectively bond fibers and/or microfibrils together by "spot bonding". This way, the fabric care polysaccharide globules can provide many desired benefits such as: fabric strengthening, fabric wear resistance and/or reduction, wrinkle removal and/or reduction, fabric pilling prevention and/or reduction, fabric color maintenance and/or fading reduction, color restoration, fabric soiling reduction, fabric shape retention, fabric shrinkage reduction, and/or improving fabric feel/smoothness, scratchiness reduction, for different types of fabrics such as cellulosic (cotton, rayon, etc.), wool, silk, and the like.

Polysaccharides with helical conformation, but not within the range of the molecular weight range specified above have different physical properties such as low solubility and gelling characteristics (e.g., starch, a high molecular weight 1,4- $\alpha$ -D-glucan).

The fabric care polysaccharides with globular structure of the present invention can provide at least some fabric care benefits to all types of fabrics, including fabrics made of natural fibers, synthetic fibers, and mixtures thereof. Nonlimiting examples of fabric types that can be treated with the fabric care compositions of the present invention, to obtain fabric care benefits include fabrics made of (1) cellulosic fibers such as cotton, rayon, linen, Tencel, (2) proteinaceous fibers such as silk, wool and related mammalian fibers, (3) synthetic fibers such as polyester, acrylic, nylon, and the like, (4) long vegetable fibers from jute, flax, ramie, coir, kapok, sisal, henequen, abaca, hemp and sunn, and (5) mixtures thereof. Other unanimated substrates and/or surfaces made with natural fibers and/or synthetic fibers, and/or materials, such as non-woven fabrics, paddings, carpets, paper, disposable products, films, foams, can also be treated with the fabric care polysaccharides with 1,3- $\beta$ -linked backbone to improve their properties.

For specific applications, the composition can contain from about 0.001% to about 10% of fabric care polysaccharide with globular structure, preferably from about 0.01% to about 10%, more preferably from about 0.1% to about 5%, by weight of the usage composition. The present invention also relates to concentrated liquid or solid compositions, which are diluted to form compositions with the usage concentrations, for use in the "usage conditions". Concentrated compositions comprise a higher level of fabric care polysaccharide, typically from about 1% to about 99%, preferably from about 2% to about 65%, more preferably from about 3% to about 40%, by weight of the

concentrated fabric care composition. Depending on the target fabric care benefit to be provided, the concentrated compositions should also comprise proportionally higher levels of the desired optional ingredients.

5           Typical composition to be dispensed from a sprayer contains a level of fabric care polysaccharide with globular structure of from about 0.01% to about 5%, preferably from about 0.05% to about 2%, more preferably from about 0.1% to about 1%, by weight of the usage composition.

10           Dryer-added compositions typically contain a level of fabric care polysaccharide with globular structure of from about 0.01% to about 10% by weight of the dryer-added compositions.

**b) Adjunct Fabric Care Oligosaccharides**

15           An optional but preferred adjunct fabric care agent in the present invention is selected from the group consisting of oligosaccharides, especially mixtures of oligosaccharides, especially, isomaltooligosaccharides (IMO) (including mixtures), the individual components of said mixtures, substituted versions thereof, derivatised versions thereof, and mixtures thereof. The adjunct fabric care oligosaccharides help to provide some fabric benefits, such as wrinkle removal and/or reduction, anti-pilling, anti-wear, fabric color maintenance, and overall appearance benefits, especially to cellulosic fibers/fabrics, such as cotton, rayon, ramie, jute, flax, linen, polynosic-fibers, Lyocell (Tencel ®), polyester/cotton blends, other cotton blends, and the like, especially cotton, rayon, linen, polyester/cotton blends, and mixtures thereof.

20           Suitable adjunct fabric care oligosaccharides that are useful in the present invention include oligosaccharides with a degree of polymerization (DP) of from about 1 to about 15, preferably from about 2 to about 10, and wherein each monomer is selected from the group consisting of reducing saccharide containing 5 and/or 6 carbon atoms, including isomaltose, isomaltotriose, isomaltotetraose, isomaltooligosaccharide, fructooligosaccharide, levoooligosaccharides, galactooligosaccharide, xylooligosaccharide, gentiooligosaccharides, disaccharides, glucose, fructose, galactose, xylose, mannose, arabinose, rhamnose, maltose, sucrose, lactose, maltulose, ribose, lyxose, allose, altrose, gulose, idose, talose, trehalose, nigerose, kojibiose, lactulose, oligosaccharides, maltooligosaccharides, trisaccharides, tetrasaccharides, pentasaccharides, hexasaccharides, oligosaccharides from partial hydrolysates of natural polysaccharide sources, and the like, and mixtures thereof, preferably mixtures of isomaltooligosaccharides, especially mixtures including isomaltooligosaccharides,

comprising from about 3 to about 7 units of glucose, respectively, and which are linked by 1,2- $\alpha$ , 1,3- $\alpha$ , 1,4- $\alpha$ - and 1,6- $\alpha$ -linkages, and mixtures of these linkages. Oligosaccharides containing  $\beta$ -linkages are also preferred. Preferred oligosaccharides are acyclic and have at least one linkage that is not an  $\alpha$ -1,4-glycosidic bond. A preferred oligosaccharide is a mixture containing IMO: from 0 to about 20 % by weight of glucose, from about 10 to about 65 % of isomaltose, from about 1% to about 45% of each of isomaltotriose, isomaltotetraose and isomaltopentaose, from 0 to about 3 % of each of isomaltohexaose, isomaltoheptaose, isomaltooctaose and isomaltononaose, from about 0.2% to about 15% of each of isomaltohexaose and isomaltoheptaose, and from 0 to about 50 % by weight of said mixture being isomaltooligosaccharides of 2 to 7 glucose units and from 0 to about 10 % by weight of said mixture being isomaltooligosaccharides of about 7 to about 10 glucose units. Other nonlimiting examples of preferred acyclic oligosaccharides, with approximate content by weight percent, are:

	Isomaltooligosaccharide Mixture I	
15	Trisaccharides (maltotriose, panose, isomaltotriose)	40-65%
	Disaccharides (maltose, isomaltose)	5-15%
	Monosaccharide (glucose)	0-20%
	Higher branched sugars (4 < DP < 10)	10-30%
	Isomaltooligosaccharide Mixture II	
20	Trisaccharides (maltotriose, panose, isomaltotriose)	10-25%
	Disaccharides (maltose, isomaltose)	10-55%
	Monosaccharide (glucose)	10-20%
	Higher branched sugars (4 < DP < 10)	5-10%
	Isomaltooligosaccharide Mixture III	
25	Tetrasaccharides (stachyose)	10-40%
	Trisaccharides (raffinose)	0-10%
	Disaccharides (sucrose, trehalose)	10-50%
	Monosaccharide (glucose, fructose)	0-10%
	Other higher branched sugars (4 < DP < 10)	0 - 5%

30 Oligosaccharide mixtures are either prepared by enzymatic reactions or separated as natural products from plant materials. The enzymatic synthesis of oligosaccharides involves either adding monosaccharides, one at a time, to a di- or higher saccharide to produce branched oligosaccharides, or it can involve the degradation of polysaccharides followed by transfer of saccharides to branching positions. For instance, Oligosaccharide Mixtures I and II are prepared by enzymatic hydrolysis of starch to

maltooligosaccharides, which are then converted to isomaltooligosaccharides by a transglucosidase reaction. Oligosaccharide Mixture III, for example, is a mixture of oligosaccharides isolated from soybean. Soybean oligosaccharides such as Mixture III, are of pure natural origin.

5           Cyclic oligosaccharides can also be useful in the fabric care composition of the present invention. Preferred cyclic oligosaccharides include a-cyclodextrin, b-cyclodextrin,  $\gamma$ -cyclodextrin, their branched derivatives such as glucosyl- $\alpha$ -cyclodextrin- $\alpha$ -diglucosyl- $\alpha$ -cyclodextrin, maltosyl- $\alpha$ -cyclodextrin, glucosyl- $\beta$ -cyclodextrin, diglucosyl- $\beta$ -cyclodextrin, and mixtures thereof. The cyclodextrins also provide an optional but very important benefit of odor control, and are disclosed more fully hereinbelow.

10           Substituted and/or derivatised materials of the oligosaccharides listed hereinabove are also preferred in the present invention. Nonlimiting examples of these materials include: carboxyl and hydroxymethyl substitutions (e.g., glucuronic acid instead of glucose); amino oligosaccharides (amine substitution, e.g., glucosamine instead of glucose); cationic quaternized oligosaccharides; C<sub>1</sub>-C<sub>6</sub> alkylated oligosaccharides; acetylated oligosaccharide ethers; oligosaccharides having amino acid residues attached (small fragments of glycoprotein); oligosaccharides containing silicone moieties. These substituted and/or derivatised oligosaccharides can provide additional benefits, such as: carboxyl and hydroxymethyl substitutions can introduce readily oxidizable materials on and in the fiber, thus reducing the probability of the fiber itself being oxidized by oxidants, such as bleaches; amine substitution can bind and/or condense with oxidatively damaged regions of the fiber to rejuvenate aged fabrics; acetylated sugar ethers can serve as bleach activators in subsequent processes where hydrogen peroxide is present; oligosaccharides having amino acid residues can improve delivery of fabric care benefits for fabrics containing proteinaceous fibers, e.g., wool and silk; and silicone-derivatised oligosaccharides can provide additional fabric softness and lubricity. C<sub>6</sub> alkyl oligosaccharide is disclosed (along with other higher, viz., C<sub>6</sub>-C<sub>30</sub>, alkyl polysaccharides) in U.S. Pat. 4,565,647, issued Jan. 21, 1986 to Llenado, for use as foaming agent in foaming compositions such as laundry detergents, personal and hair cleaning compositions, and fire fighting compositions. The C<sub>6</sub> alkyl oligosaccharide is a poor surfactant and not preferred for use as surfactant in the present invention, but preferably can be used to provide the fabric care benefits that are not known, appreciated and/or disclosed in U.S. Pat No. 4,565,647. U.S. Pat. No. 4,488,981, issued Dec. 18, 1984 discloses the use of some C<sub>1</sub>-C<sub>6</sub> alkylated oligosaccharides (lower alkyl

glycosides) in aqueous liquid detergents to reduce their viscosity and to prevent phase separation. C<sub>1</sub>-C<sub>6</sub> alkylated oligosaccharides can be used to provide the fabric care benefits that are not known, appreciated and/or disclosed in U.S. Pat No.4,488,981. These patents are incorporated herein by reference.

5 It is believed that the fabric care oligosaccharide is adsorbed and binds with cellulosic fabrics to improve the properties of the fabrics. It is believed that the fabric care oligosaccharide is bound to the cellulosic fibers, diffuses in and fills the defect sites (the amorphous region) of the fiber, to provide the above dewrinkling, increased strength and improved appearance benefits. The extent of the amorphous, non-crystalline region varies with cellulosic fiber types, e.g., the relative crystallinity of cotton is about 70.% and for regenerated cellulose, such as, rayon it is about 30.% , as reported by P. H. Hermans and A. Weidinger, "X-ray studies on the crystallinity of cellulose" in the *Journal of Polymer Science*, Vol IV, p135-144, 1949. It is believed that the amorphous regions are accessible for chemical and physical modifications, and that in the durable press treatment, the amorphous regions are filled with molecules that can crosslink cellulose polymers by covalent bonds, to deliver wrinkle-free benefits (cf. S. P. Rawland, in "Modified Cellulosics," R. M. Rowell and R. A. Young, Eds., Academic Press, New York, 1978, pp. 147-167, cited by G. C. Tesoro, in 'Crosslinking of cellulosics', Handbook of Fiber Science and Technology, Vol. II, p.6, edited by M. Lewin and S. B. Sello, published by Marcel Dekker, 1983. These publications are incorporated herein by reference.

10 For some aspects of the present invention the composition can contain from about 0.001% to about 10% of the optional, but preferred oligosaccharide, preferably from about 0.01% to about 8%, more preferably from about 0.1% to about 5%, by weight of the usage composition.

15 25 Typical composition to be dispensed from a sprayer contains a level of optional fabric care oligosaccharide of from about 0.01% to about 3%, preferably from about 0.05% to about 2%, more preferably from about 0.1% to about 1%, by weight of the usage composition.

30 Dryer-added compositions typically contain a level of optional fabric care oligosaccharide of from about 0.01% to about 10%.

35 Both the primary fabric care polysaccharides and the adjunct fabric care oligosaccharides have a compact structure, but they have different sizes. The smaller oligosaccharides are believed to be able to diffuse and penetrate into small defective sites, such as the amorphous region of cotton fibers, while the larger polysaccharides can

fill in larger openings and/or defective sites on the fabric fiber surface. Therefore depending on the fabric care benefit target, the primary fabric care polysaccharides and the adjunct fabric care polysaccharide can be used alone, or in mixtures. When the adjunct fabric care polysaccharide (e.g. oligosaccharides) are present, the weight ratio between said oligosaccharides and the fabric care polysaccharides is typically from about 1:99 to about 99:1, preferably from about 15:85 to about 85:15, and more preferably from about 30:70 to about 70:30.

## 5. MIXTURES THEREOF

As stated hereinbefore, the composition can also contain mixtures of fiber lubricant, shape retention polymer, lithium salts, and/or fabric care polysaccharides.

### C. SURFACTANTS

Surfactant is an optional but highly preferred ingredient of the present invention. Surfactant is especially useful in the composition to facilitate the dispersion, emulsification and/or solubilization of wrinkle control agents such as silicones and/or certain relatively water insoluble shape retention polymers. The surfactant can provide some plasticizing effect to the shape retention polymers resulting in a more flexible polymer network. Surfactants can provide a low surface tension that permits the composition to spread readily and more uniformly on hydrophobic surfaces like polyester and nylon. Surfactants also help the composition penetrate fibers more thoroughly to provide hydrogen bond breaking, lubricity and plasticity at every level of the fiber structure. Surfactant also aids the composition in penetrating fabrics treated with hydrophobic fabric finishes that tend to repel water. Residual surfactant also helps keep fibrils flat against the fiber surface, thus smoothing the surface and aiding in wrinkle release. Residual surfactant can also act to stiffen fibers, thus helping to prevent rewrinkling. Surfactant is preferably included when the composition is used in a spray dispenser and/or a dispenser for use in a clothes dryer other fabric modifying machine in order to enhance the spray and/or dispensing characteristics of the composition and allow the composition to distribute more evenly, and to prevent clogging of the spray apparatus and/or dispenser apparatus. The spreading of the composition can also allow it to dry faster, so that the treated material is ready to use sooner. For concentrated compositions, the surfactant facilitates the dispersion of many actives such as antimicrobial actives and perfumes in the concentrated aqueous compositions.

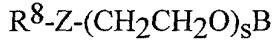
Surfactants normally fall into several groups, nonionic surfactants, ionic surfactants, amphoteric surfactants, and fluorine-based surfactants. Another special class of surfactants are cyclodextrin compatible surfactants which are

disclosed under the section titled 'Odor Control Agents'. It is preferred to use cyclodextrin compatible surfactants when optional cyclodextrin is incorporated in the formulation.

When optional surfactants are incorporated, typical levels are at least about 0.0001%, preferably 0.001%, more preferably at least about 0.01%, and even more preferably at least about 0.1% and typically less than about 20%, preferably less than about 15%, more preferably less than about 10%, even more preferably less than about 5% and most preferably less than about 3% of the weight of the composition.

## 10 1. NONIONIC SURFACTANTS

A preferred, but nonlimiting, type of nonionic surfactant is alkyl ethoxylated surfactant, such as addition products of ethylene oxide with fatty alcohols, fatty acids, fatty amines, etc. Optionally, addition products of mixtures of ethylene oxide and propylene oxide with fatty alcohols, fatty acids, fatty amines can be used. The ethoxylated surfactant includes compounds having the general formula:



wherein  $R^8$  is an alkyl group or an alkyl aryl group, selected from the group consisting of primary, secondary and branched chain alkyl hydrocarbyl groups, primary, secondary and branched chain alkenyl hydrocarbyl groups, and/or primary, secondary and branched chain alkyl- and alkenyl-substituted phenolic hydrocarbyl groups having from about 6 to about 20 carbon atoms, preferably from about 8 to about 18, more preferably from about 10 to about 15 carbon atoms;  $s$  is an integer from about 2 to about 45, preferably from about 2 to about 20, more preferably from about 2 to about 15;  $B$  is hydrogen, a carboxylate group, or a sulfate group; and linking group  $Z$  is selected from the group consisting of:  $-O-$ ,  $-N(R)_x-$ ,  $-C(O)O-$ ,  $-C(O)N(R)-$ ,  $-C(O)N(R)-$ , and mixtures thereof, in which  $R$ , when present, is  $R^8$ , a lower alkyl with about 1 to about 4 carbons, a polyalkylene oxide, or hydrogen, and  $x$  is 1 or 2.

30 The nonionic alkyl ethoxylated surfactants herein are characterized by an HLB (hydrophilic-lipophilic balance) of from about 5 to about 20, preferably from about 6 to about 15.

Nonlimiting examples of preferred alkyl ethoxylated surfactants are:

- straight-chain, primary alcohol ethoxylates, with  $R^8$  being C<sub>8</sub>-C<sub>18</sub> alkyl and/or alkenyl group, more preferably C<sub>10</sub>-C<sub>14</sub>, and s being from about 2 to about 8, preferably from about 2 to about 6;
- 5 - straight-chain, secondary alcohol ethoxylates, with  $R^8$  being C<sub>8</sub>-C<sub>18</sub> alkyl and/or alkenyl, e.g., 3-hexadecyl, 2-octadecyl, 4-eicosanyl, and 5-eicosanyl, and s being from about 2 to about 10;
- 10 - alkyl phenol ethoxylates wherein the alkyl phenols having an alkyl or alkenyl group containing from about 3 to about 20 carbon atoms in a primary, secondary or branched chain configuration, preferably from about 6 to about 12 carbon atoms, and s is from about 2 to about 12, preferably from about 2 to about 8;
- 15 - branched chain alcohol ethoxylates, wherein branched chain primary and secondary alcohols (or Guerbet alcohols) which are available, e.g., from the well-known "OXO" process, or modification thereof, are ethoxylated.
- 20 Especially preferred are alkyl ethoxylate surfactants with each  $R^8$  being C<sub>8</sub>-C<sub>16</sub> straight chain and/or branch chain alkyl and the number of ethyleneoxy groups s being from about 2 to about 6, preferably from about 2 to about 4, more preferably with  $R^8$  being C<sub>8</sub>-C<sub>15</sub> alkyl and s being from about 2.25 to about 3.5. These nonionic surfactants are characterized by an HLB of from 6 to about 11, preferably from about 6.5 to about 9.5, and more preferably from about 7 to about 9. Nonlimiting examples of commercially available preferred surfactants are Neodol 91-2.5 (C<sub>9</sub>-C<sub>10</sub>, s = 2.7, HLB = 8.5), Neodol 23-3 (C<sub>12</sub>-C<sub>13</sub>, s = 2.9, HLB = 7.9) and Neodol 25-3 (C<sub>12</sub>-C<sub>15</sub>, s = 2.8, HLB = 7.5). It is found, very surprisingly, that these preferred surfactants which are themselves not very water soluble (0.1% aqueous solutions of these surfactants are not clear), can at low levels, effectively emulsify and/or disperse silicone oils and these surfactants can also solubilize and/or disperse shape retention polymers such as copolymers containing acrylic acid and tert-butyl acrylate into clear compositions, even without the presence of a low molecular weight alcohol. Many nonlimiting examples of suitable nonionic surfactants are given in the table below.
- 25
- 30 Other useful nonionic alkyl alkoxyated surfactants are ethoxylated alkyl amines derived from the condensation of ethylene oxide with hydrophobic alkyl amines, with  $R^8$  having from about 8 to about 22 carbon atoms and s being from about 3 to about 30.

Other examples of useful ethoxylated surfactant include carboxylated alcohol ethoxylate, also known as ether carboxylate, with R<sup>8</sup> having from about 12 to about 16 carbon atoms and s being from about 5 to about 13; ethoxylated alkyl amine or quaternary ammonium surfactants, R<sup>8</sup> having from about 8 to about 22 carbon atoms and s being from about 3 to about 30, such as PEG-5 cocomonium methosulfate, PEG-15 cocomonium chloride, PEG-15 oleammonium chloride and bis(polyethoxyethanol)taffoyl ammonium chloride.

Additional suitable nonionic surfactants include surfactants derived from carbohydrates such as sorbitan esters, especially sorbitan monoesters, also alkyl glucosides, and alkyl polyglucosides. A specific description of many surfactants which are derived from carbohydrates can be found in *Handbook of Surfactants*, M.R. Porter, 1991, Blackie & Son Ltd, pp. 142-145. Glucamines are additional examples of surfactants derived from carbohydrates and are included herein by reference to U.S. Pat. No. 5,194,639 issued March 16, 1993 to D.S. Connor, J.J. Scheibel, and R.G. Severson; U.S. Pat. No. 5,338,487 issued August 16, 1993 to D.S. Connor, J.J. Scheibel, and J.-N. Kao; U.S. Pat. No. 5,489,393 issued February 6, 1996 to D.S. Connor, J.J. Scheibel, and Y.C. Fu; and U.S. Pat. No. 5,512,699 issued April 30, 1996 to D.S. Connor, Y.C. Fu, and J.J. Scheibel. Preferred alkyl polyglucosides are those having aqueous surface tension below about 35 mN/m such as AG 6202 and AG6210 from Akzo Nobel Chemicals, Inc., Chicago, IL.

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Table 1. Nonlimiting Examples of Some Suitable Nonionic Surfactants.

Name	Structure	HLB Value	Suppliers
Neodol® 91-2.5	C9-C10 - 2.7EO	8.5	Shell Chemical Co.
Neodol® 23-1	C12-C13 - 1.0EO	3.7	Shell Chemical Co.
Neodol® 23-2	C12-C13 -2.0EO	5.9	Shell Chemical Co.
Neodol® 23-3	C12-C13 - 2.9EO	7.9	Shell Chemical Co.
Neodol® 25-3	C12-C15 - 2.8EO	7.5	Shell Chemical Co.
Neodol® 23-5	C12-C13 - 5.0EO	10.7	Shell Chemical Co.
Neodol® 25-9	C12-C15 - 8.9EO	13.1	Shell Chemical Co.
Neodol® 25-12	C12-C15 - 11.9EO	14.4	Shell Chemical Co.
Hetoxol® TD-3	C13 - 3EO	7.9	Heterene Inc.
Hetoxol® OL-5	Oleyl - 5EO	8.0	Heterene Inc.
Kessco® PEG-8 Mono oleate	Oleoyl - 8EO	11.0	Stepan Co.
Kessco® Glycero monooleate	Glyceryl mono-oleate	3.8	Stepan Co.
Arlacel® 20	Sorbitan mono-laurate	8.6	ICI Americas

## 2. IONIC SURFACTANTS

Nonlimiting preferred ionic surfactants are the class of anionic surfactants. Anionic surfactants are preferred ionic surfactants since they are least likely to leave residues. Many suitable nonlimiting examples from the class of anionic surfactants can be found in *Surfactants and Interfacial Phenomena*, 2<sup>nd</sup> Ed., Milton J. Rosen, 1989, John Wiley & Sons, Inc., pp. 7-16, which is hereby incorporated by reference. Additional suitable nonlimiting examples of anionic surfactants can be found in *Handbook of Surfactants*, M.R. Porter, 1991, Blackie & Son Ltd, pp. 54-115 and references therein, the disclosure of which is incorporated herein by reference.

Structurally, suitable anionic surfactants contain at least one hydrophobic moiety and at least one hydrophilic moiety. The surfactant can contain multiple hydrophobic moieties and/or multiple hydrophilic moieties, but preferably less than or equal to about 2 hydrophobic moieties and less than or equal to about 3 hydrophilic moieties. The hydrophobic moiety is typically comprised of hydrocarbons either as an alkyl group or an alkyl-aryl group. Alkyl groups typically contain from about 6 to about 22 carbons, preferably about 10 to about 18 carbons, and more preferably from about 12 to about 16 carbons; aryl groups

5 typically contain alkyl groups containing from about 4 to about 6 carbons. Each alkyl group can be a branched or linear chain and is either saturated or unsaturated. A typical aryl group is benzene. Some typical hydrophilic groups for anionic surfactants include but are not limited to  $-CO_2^-$ ,  $-OSO_3^-$ ,  $-SO_3^-$ ,  $-(OR_1)_x-CO_2^-$ ,  $-(OR_1)_x-OSO_3^-$ ,  $-(OR_1)_x-SO_3^-$ . With x being less than about 10 and preferably less than about 5. Some nonlimiting examples of suitable surfactants includes, Stepanol<sup>®</sup> WAC, Biosoft<sup>®</sup> 40 (Stepan Co., Northfield, IL).

10 Other suitable ionic surfactants include the cationic surfactants. Nonlimiting examples of these classes of surfactants can be found in *Handbook of Surfactants*, M.R. Porter, 1991, Blackie & Son Ltd, pp. 179-202 as well as in *Surfactants and Interfacial Phenomena*, 2<sup>nd</sup> Ed., Milton J. Rosen, 1989, John Wiley & Sons, Inc., pp. 17-20 and pp. 28-31 and references therein, the disclosures of which are hereby incorporated herein by reference.

### 3. AMPHOTERIC SURFACTANTS

15 Amphoteric surfactants are suitable for use in the present invention. Amphoteric surfactants, also referred to as zwitterionic surfactants comprise multiple head groups having both negative and positive charge or at least the capacity to acquire negative and positive charge. Amphoteric surfactants have advantages over other surfactants since these are less irritating to the skin and yet still provide good wetting. Some nonlimiting examples of amphoteric surfactants useful for the present invention are: betaines, amine-oxides, sulfobetaines, sultaines, glycinates, aminoipropionates, imidazoline-based amphoteric. Various amphoteric surfactants are disclosed in the *Handbook of Surfactants* by M.R. Porter, Chapman & Hall, 1991 and references therein and in *Surfactants and Interfacial Phenomena* by M. Rosen, 2<sup>nd</sup> Ed., John Wiley & Sons, 1989 and references therein and these are incorporated herein by reference.

### 4. FLUOROCARBON SURFACTANTS

30 Fluorocarbon surfactants are the class of surfactants wherein the hydrophobic part of the amphiphile comprises at least in part some portion of a carbon-based linear or cyclic moiety having fluorines attached to the carbon where typically hydrogens would be attached to the carbons together with a hydrophilic head group. Some typical nonlimiting fluorocarbon surfactants include fluorinated alkyl polyoxyalkylene, and fluorinated alkyl esters as well as ionic surfactants. Representative structures for these compounds are given below:

- (1)  $R_fR(R_1O)_xR_2$
- (2)  $R_fR-OC(O)R_3$
- (3)  $R_fR-Y-Z$
- (4)  $R_fRZ$

5 where  $R_f$  contains from about 6 to about 18 carbons each having from about 0 to about 3 fluorines attached.  $R$  is either an alkyl or alkylene oxide group which when present, has from about 1 to about 10 carbons and  $R_1$  represents an alkylene radical having from about 1 to about 4 carbons,  $R_2$  is either a hydrogen or a small alkyl capping group having from about 1 to about 3 carbons.  $R_3$  represents a hydrocarbon moiety comprising from about 2 to about 22 including the carbon on the ester group. This hydrocarbon can be linear, branched or cyclic saturated or unsaturated and contained moieties based on oxygen, nitrogen, and sulfur including, but not limited to ethers, alcohols, esters, carboxylates, amides, amines, thio-esters, and thiols; these oxygen, nitrogen, and sulfur moieties can either interrupt the hydrocarbon chain or be pendant on the hydrocarbon chain. In structure 3,  $Y$  represents a hydrocarbon group that can be an alkyl, pyridine group, amidopropyl, etc. that acts as a linking group between the fluorinated chain and the hydrophilic head group. In structures 3 and 4,  $Z$  represents a cationic, anionic, and amphoteric hydrophilic head groups including, but not limited to carboxylates, sulfates, sulfonates, quaternary ammonium groups, and betaines. Nonlimiting commercially available examples of these structures include Zonyl® 9075, FSO, FSN, FS-300, FS-310, FSN-100, FSO-100, FTS, TBC from DuPont and Fluorad™ surfactants FC-430, FC-431, FC-740, FC-99, FC-120, FC-754, FC170C, and FC-171 from the 3M™ company in St. Paul, Minnesota.

25 **D. ORGANIC SOLVENTS**

Optional optional organic solvents include solvents and plasticizers and plasticizers act that aid the natural ability of the said composition to plasticize fibers and these provide many other benefits as well to the present invention which are disclosed herein. Many organic solvents reduce the surface tension of said composition to achieve better spreading and penetration particularly on surfaces that tend to be hydrophobic. Organic solvents modify dry times both by increasing or decreasing the dry time, whichever is desirable for a particular aspect of the present invention. For some aspects of the present invention, it is preferred to decrease dry time e.g. such that consumers may wear clothes quickly after the treatment is applied. When it is desired to increase dry time, it is typical to include at least about 3% solvent or plasticizer, preferably at least about 5% solvent or

plasticizer by weight of the composition. For some aspects of the present invention, it is preferred to slow the drying time e.g. to maintain fiber plasticization for a longer period of time and therefore have more time to effect wrinkle removal.

5 Low molecular weight polyols with relatively high boiling points, as compared to water, such as ethylene glycol, propylene glycol and/or glycerol are preferred optional ingredients for improving odor control performance of the composition of the present invention, especially when cyclodextrin is present, as disclosed herein below under the section on odor control agents. Some organic solvents provide anti-microbial efficacy as disclosed herein under the section on anti-microbial actives.

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15 Acceptable organic solvents include compounds having from one to ten carbons. The following non-limiting classes of compounds are suitable: mono-alcohols, diols, polyhydric alcohols, ethers, ketones, esters, organic acids, and alkyl glyceryl ethers, and hydrocarbons. While all organic solvents as defined above are acceptable in the present invention, typically, organic solvents that are miscible and/or soluble in water are preferred. On the other hand, when a immiscible or insoluble organic solvent has other desirable properties, e.g. low odor or favorable economics, such that it is the acceptable or in some aspects of the present invention, the preferred organic solvent, surfactants, as disclosed herein, can be used to increase miscibility and solubility. Some nonlimiting examples include methanol, ethanol, isopropanol, hexanol, 1,2-hexanediol, hexylene glycol, (e.g. 2-methyl-2,4-pentanediol), isopropyl glycol (3-methyl-1,3-butanediol), 1,2-butylene glycol, 2,3-butylene glycol, 1,3-butylene glycol, 1,4-butylene glycol, 1,3-propylene glycol, 1,2-propylene glycol, isomers of cyclohexanedimethanol, isomers of propanediol, isomers of butanediol, the isomers of trimethylpentanediol, the isomers of ethylmethylpentanediol, alcohol ethoxylates of 2-ethyl-1,3-hexanediol, 2,2,4-trimethyl-1,3-pentanediol, alcohol ethoxylates of 2,2,4-trimethyl-1,3-pentanediol glycerol, ethylene glycol, diethylene glycol, dipropylene glycol, sorbitol, 3-methyl-3-methoxybutanol, 3-methoxybutanol, 1-ethoxy-2-propanol, diethylene glycol monoethyl ether, diethylene glycol monopropyl ether, diethylene glycol monobutyl ether, triethylene glycol monoethyl ether, erythritol, and mixtures of solvents and plasticizers. When optional cyclodextrin is present, the plasticizer should be compatible with it.

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35 Mixtures of organic solvents are also suitable.

When organic solvent is used, it is used typically at a level of at least about 0.5%, preferably at least about 1%, more preferably at least about 2%, even more preferably at least about 3% and still more preferably at least about 4% and typically less than about 30%, preferably less than about 25%, more preferably less than about 20%, even more preferably less than about 15% by weight of the composition. To reduce concerns associated with emitting volatile organic compounds into the environment and reduce safety issues associated with flammability, it is typical to limit the amount of solvent in the composition to lower than about 10%, and preferably lower than about 7% by weight of the composition. It is preferably for the usage composition to have a flash point of at least about 55 °C, more preferably at least about than about 60 °C, even more preferably at least about 65 °C. It is acceptable for the present invention to use mixtures of solvents and/or plasticizers.

#### E. MALODOR CONTROL AGENT

The compositions for odor control are of the type disclosed in U.S. Pats. 5,534,165; 5,578,563; 5,663,134; 5,668,097; 5,670,475; and 5,714,137, Trinh et al. issued Jul. 9, 1996; Nov. 26, 1996; Sep. 2, 1997; Sep. 16, 1997; Sep. 23, 1997; and Feb. 3, 1998 respectively, all of said patents being incorporated herein by reference. Such compositions can contain several different optional odor control agents in addition to the polymers described hereinbefore that can control amine odors.

#### **1. CYCLODEXTRIN**

As used herein, the term "cyclodextrin" includes any of the known cyclodextrins such as unsubstituted cyclodextrins containing from six to twelve glucose units, especially, alpha-cyclodextrin, beta-cyclodextrin, gamma-cyclodextrin and/or their derivatives and/or mixtures thereof. The alpha-cyclodextrin consists of six glucose units, the beta-cyclodextrin consists of seven glucose units, and the gamma-cyclodextrin consists of eight glucose units arranged in donut-shaped rings. The specific coupling and conformation of the glucose units give the cyclodextrins a rigid, conical molecular structures with hollow interiors of specific volumes. The "lining" of each internal cavity is formed by hydrogen atoms and glycosidic bridging oxygen atoms; therefore, this surface is fairly hydrophobic. The unique shape and physical-chemical properties of the cavity enable the cyclodextrin molecules to absorb (form inclusion complexes with) organic molecules or parts of organic molecules which can fit into the cavity. Many odorous molecules can fit into the cavity including many malodorous

5 molecules and perfume molecules. Therefore, cyclodextrins, and especially mixtures of cyclodextrins with different size cavities, can be used to control odors caused by a broad spectrum of organic odoriferous materials, which may, or may not, contain reactive functional groups. The complexation between cyclodextrin and odorous molecules occurs rapidly in the presence of water. However, the extent of the complex formation also depends on the polarity of the absorbed molecules. In an aqueous solution, strongly hydrophilic molecules (those which are highly water-soluble) are only partially absorbed, if at all. Therefore, cyclodextrin does not complex effectively with some very low molecular weight 10 organic amines and acids when they are present at low levels on wet fabrics. As the water is being removed however, e.g., the fabric is being dried off, some low molecular weight organic amines and acids have more affinity and will complex with the cyclodextrins more readily.

15 The cavities within the cyclodextrin in the solution of the present invention should remain essentially unfilled (the cyclodextrin remains uncomplexed) while in solution, in order to allow the cyclodextrin to absorb various odor molecules when the solution is applied to a surface. Non-derivatised (normal) beta-cyclodextrin can be present at a level up to its solubility limit of about 1.85% (about 1.85g in 100 grams of water) at room temperature. Beta-cyclodextrin is not preferred in compositions which call for a level of cyclodextrin higher than its 20 water solubility limit. Non-derivatised beta-cyclodextrin is generally not preferred when the composition contains surfactant since it affects the surface activity of most of the preferred surfactants that are compatible with the derivatised cyclodextrins..

25 Preferably, the cyclodextrins used in the present invention are highly water-soluble such as, alpha-cyclodextrin and/or derivatives thereof, gamma-cyclodextrin and/or derivatives thereof, derivatised beta-cyclodextrins, and/or mixtures thereof. The derivatives of cyclodextrin consist mainly of molecules wherein some of the OH groups are converted to OR groups. Cyclodextrin derivatives include, e.g., 30 those with short chain alkyl groups such as methylated cyclodextrins, and ethylated cyclodextrins, wherein R is a methyl or an ethyl group; those with hydroxyalkyl substituted groups, such as hydroxypropyl cyclodextrins and/or hydroxyethyl cyclodextrins, wherein R is a -CH<sub>2</sub>-CH(OH)-CH<sub>3</sub> or a -CH<sub>2</sub>CH<sub>2</sub>-OH group; branched cyclodextrins such as maltose-bonded cyclodextrins; cationic 35 cyclodextrins such as those containing 2-hydroxy-3-(dimethylamino)propyl ether,

wherein R is  $\text{CH}_2\text{-CH(OH)-CH}_2\text{-N}(\text{CH}_3)_2$  which is cationic at low pH; 5  
quaternary ammonium, e.g., 2-hydroxy-3-(trimethylammonio)propyl ether  
chloride groups, wherein R is  $\text{CH}_2\text{-CH(OH)-CH}_2\text{-N}^+(\text{CH}_3)_3\text{Cl}^-$ ; anionic  
cyclodextrins such as carboxymethyl cyclodextrins, cyclodextrin sulfates, and  
cyclodextrin succinylates; amphoteric cyclodextrins such as  
10 carboxymethyl/quaternary ammonium cyclodextrins; cyclodextrins wherein at  
least one glucopyranose unit has a 3-6-anhydro-cyclomalto structure, e.g., the  
mono-3-6-anhydrocyclodextrins, as disclosed in "Optimal Performances with  
Minimal Chemical Modification of Cyclodextrins", F. Diedaini-Pilard and B.  
Perly, The 7th International Cyclodextrin Symposium Abstracts, April 1994, p. 49,  
said references being incorporated herein by reference; and mixtures thereof.  
Other cyclodextrin derivatives are disclosed in U.S. Pat. Nos.: 3,426,011,  
15 Parmerter et al., issued Feb. 4, 1969; 3,453,257; 3,453,258; 3,453,259; and  
3,453,260, all in the names of Parmerter et al., and all issued July 1, 1969;  
3,459,731, Gramera et al., issued Aug. 5, 1969; 3,553,191, Parmerter et al., issued  
Jan. 5, 1971; 3,565,887, Parmerter et al., issued Feb. 23, 1971; 4,535,152, Szejtli et  
al., issued Aug. 13, 1985; 4,616,008, Hirai et al., issued Oct. 7, 1986; 4,678,598,  
20 Ogino et al., issued Jul. 7, 1987; 4,638,058, Brandt et al., issued Jan. 20, 1987; and  
4,746,734, Tsuchiyama et al., issued May 24, 1988; all of said patents being  
incorporated herein by reference.

Highly water-soluble cyclodextrins are those having water solubility of at  
least about 10 g in 100 ml of water at room temperature, preferably at least about  
20 g in 100 ml of water, more preferably at least about 25 g in 100 ml of water at  
25 room temperature. The availability of solubilized, uncomplexed cyclodextrins is  
essential for effective and efficient odor control performance. Solubilized, water-  
soluble cyclodextrin can exhibit more efficient odor control performance than non-  
water-soluble cyclodextrin when deposited onto surfaces, especially fabric.

Examples of preferred water-soluble cyclodextrin derivatives suitable for use  
herein are hydroxypropyl alpha-cyclodextrin, methylated alpha-cyclodextrin,  
30 methylated beta-cyclodextrin, hydroxyethyl beta-cyclodextrin, and hydroxypropyl  
beta-cyclodextrin. Hydroxyalkyl cyclodextrin derivatives preferably have a degree  
of substitution of from about 1 to about 14, more preferably from about 1.5 to  
about 7, wherein the total number of OR groups per cyclodextrin is defined as the  
degree of substitution. Methylated cyclodextrin derivatives typically have a degree  
35 of substitution of from about 1 to about 18, preferably from about 3 to about 16. A

known methylated beta-cyclodextrin is heptakis-2,6-di-O-methyl- $\beta$ -cyclodextrin, commonly known as DIMEB, in which each glucose unit has about 2 methyl groups with a degree of substitution of about 14. A preferred, more commercially available, methylated beta-cyclodextrin is a randomly methylated beta-cyclodextrin, commonly known as RAMEB, having different degrees of substitution, normally of about 12.6. RAMEB is more preferred than DIMEB, since DIMEB affects the surface activity of the preferred surfactants more than RAMEB. The preferred cyclodextrins are available, e.g., from Cerestar USA, Inc. and Wacker Chemicals (USA), Inc.

It is also preferable to use a mixture of cyclodextrins. Such mixtures absorb odors more broadly by complexing with a wider range of odoriferous molecules having a wider range of molecular sizes. Preferably at least a portion of the cyclodextrins is alpha-cyclodextrin and its derivatives thereof, gamma-cyclodextrin and its derivatives thereof, and/or derivatised beta-cyclodextrin, more preferably a mixture of alpha-cyclodextrin, or an alpha-cyclodextrin derivative, and derivatised beta-cyclodextrin, even more preferably a mixture of derivatised alpha-cyclodextrin and derivatised beta-cyclodextrin, most preferably a mixture of hydroxypropyl alpha-cyclodextrin and hydroxypropyl beta-cyclodextrin, and/or a mixture of methylated alpha-cyclodextrin and methylated beta-cyclodextrin.

Preferably, the solution used to treat the surface under usage conditions is virtually not discernible when dry. Typical levels of cyclodextrin in usage compositions for usage conditions are from about 0.01% to about 5%, preferably from about 0.1% to about 4%, more preferably from about 0.5% to about 2% by weight of the composition. Compositions with higher concentrations can leave unacceptable visible stains on fabrics as the solution evaporates off of the fabric. This is especially a problem on thin, colored, synthetic fabrics. In order to avoid or minimize the occurrence of fabric staining, it is preferable that the fabric be treated at a level of less than about 5 mg of cyclodextrin per gram of fabric, more preferably less than about 2 mg of cyclodextrin per gram of fabric. The presence of the surfactant can improve appearance by minimizing localized spotting.

When it is desired to incorporate cyclodextrin into a concentrated product, the cyclodextrin level is typically from about 3% to about 20%, more preferably from about 5% to about 10%, by weight of the concentrated composition, it is preferable to dilute the concentrated composition before treating fabrics in order to avoid staining. The resulting diluted composition have usage concentrations of

cyclodextrin as discussed hereinbefore, e.g., of from about 0.1% to about 5%, by weight of the diluted composition.

**Cyclodextrin-Compatible Surfactant**

When the optional cyclodextrin is present, the surfactant for use in providing the required low surface tension in the composition of the present invention should be cyclodextrin-compatible, that is it should not substantially form a complex with the cyclodextrin so as to diminish performance of the cyclodextrin and/or the surfactant when cyclodextrin is present. Complex formation diminishes both the ability of the cyclodextrin to absorb odors and the ability of the surfactant to lower the surface tension of the aqueous composition.

Suitable cyclodextrin-compatible surfactants can be readily identified by the absence of effect of cyclodextrin on the surface tension provided by the surfactant. This is achieved by determining the surface tension (in dyne/cm<sup>2</sup>) of aqueous solutions of the surfactant in the presence and in the absence of about 1% of a specific cyclodextrin in the solutions. The aqueous solutions contain surfactant at concentrations of approximately 0.5%, 0.1%, 0.01%, and 0.005%. The cyclodextrin can affect the surface activity of a surfactant by elevating the surface tension of the surfactant solution. If the surface tension at a given concentration in water differs by more than about 10% from the surface tension of the same surfactant in the 1% solution of the cyclodextrin, that is an indication of a strong interaction between the surfactant and the cyclodextrin. The preferred surfactants herein should have a surface tension in an aqueous solution that is different (lower) by less than about 10%, preferably less than about 5%, and more preferably less than about 1% from that of the same concentration solution containing 1% cyclodextrin.

Nonlimiting examples of cyclodextrin-compatible nonionic surfactants include block copolymers of ethylene oxide and propylene oxide. Suitable block polyoxyethylene-polyoxypropylene polymeric surfactants, that are compatible with most cyclodextrins, include those based on ethylene glycol, propylene glycol, glycerol, trimethylolpropane and ethylenediamine as the initial reactive hydrogen compound. Polymeric compounds made from a sequential ethoxylation and propoxylation of initial compounds with a single reactive hydrogen atom, such as C<sub>12-18</sub> aliphatic alcohols, are not generally compatible with the cyclodextrin. Certain of the block polymer surfactant compounds designated Pluronic® and Tetronic® by the BASF-Wyandotte Corp., Wyandotte, Michigan, are readily available.

Nonlimiting examples of cyclodextrin-compatible surfactants of this type include:

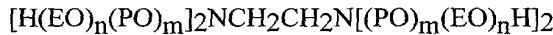
Pluronic Surfactants with the general formula H(EO)<sub>n</sub>(PO)<sub>m</sub>(EO)<sub>n</sub>H,

wherein EO is an ethylene oxide group, PO is a propylene oxide group, and n and m are numbers that indicate the average number of the groups in the surfactants. Typical examples of cyclodextrin-compatible Pluronic surfactants are:

	Name	Average MW	Average n	Average m
5	L-101	3,800	4	59
	L-81	2,750	3	42
	L-44	2,200	10	23
	L-43	1,850	6	22
	F-38	4,700	43	16
10	P-84	4,200	19	43,

and mixtures thereof.

Tetronic Surfactants with the general formula:



wherein EO, PO, n, and m have the same meanings as above. Typical examples

15 of cyclodextrin-compatible Tetronic surfactants are:

Name	Average MW	Average n	Average m
901	4,700	3	18
908	25,000	114	22,

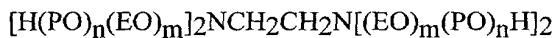
and mixtures thereof.

20 "Reverse" Pluronic and Tetronic surfactants have the following general formulas:

Reverse Pluronic Surfactants



Reverse Tetronic Surfactants



25 wherein EO, PO, n, and m have the same meanings as above. Typical examples of cyclodextrin-compatible Reverse Pluronic and Reverse Tetronic surfactants are:

Reverse Pluronic surfactants:

	Name	Average MW	Average n	Average m
30	10 R5	1,950	8	22
	25 R1	2,700	21	6

## Reverse Tetronic surfactants

Name	Average MW	Average n	Average m
130 R2	7,740	9	26
70 R2	3,870	4	13

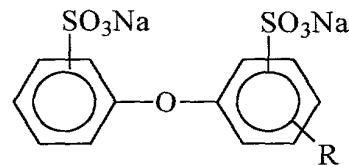
5 and mixtures thereof.

Silicone Polyethers

10 Silicone polyethers can also act as a preferred class of cyclodextrin surfactants when these have a dimethyl polysiloxane hydrophobic moiety and one or more hydrophilic polyalkylene side chains, and having. The general formula of this class of surfactants is disclosed above under the section on optional silicones.

Cyclodextrin Compatible Anionic Surfactants

Nonlimiting examples of cyclodextrin-compatible anionic surfactants are the alkylidiphenol oxide disulfonate, having the general formula:



15

wherein R is an alkyl group. Examples of this type of surfactants are available from the Dow Chemical Company under the trade name Dowfax® wherein R is a linear or branched C<sub>6</sub>-C<sub>16</sub> alkyl group. An example of these cyclodextrin-compatible anionic surfactant is Dowfax 3B2 with R being approximately a linear C<sub>10</sub> group. These anionic surfactants are preferably not used when the antimicrobial active or preservative, etc., is cationic to minimize the interaction with the cationic actives, since the effect of both surfactant and active are diminished.

20

25

The surfactants above are either weakly interactive with cyclodextrin (less than 5% elevation in surface tension, or non-interactive (less than 1% elevation in surface tension). Normal surfactants like sodium dodecyl sulfate and dodecanolpoly(6)ethoxylate are strongly interactive, with more than a 10% elevation in surface tension in the presence of a typical cyclodextrin like hydroxypropyl-beta-cyclodextrin and methylated beta-cyclodextrin.

30

Typical levels of cyclodextrin-compatible surfactants in usage compositions are from about 0.01% to about 2%, preferably from about 0.03% to about 0.6%, more

preferably from about 0.05% to about 0.3%, by weight of the composition. Typical levels of cyclodextrin-compatible surfactants in concentrated compositions are from about 0.1% to about 8%, preferably from about 0.2% to about 4%, more preferably from about 0.3% to about 3%, by weight of the concentrated composition.

5

## 2. LOW MOLECULAR WEIGHT POLYOLS

10

Low molecular weight polyols with relatively high boiling points, as compared to water, such as ethylene glycol, propylene glycol and/or glycerol are preferred optional ingredients for improving odor control performance of the composition of the present invention, especially when cyclodextrin is present. The incorporation of a small amount of low molecular weight glycols into the composition of the present invention typically enhances the formation of the cyclodextrin inclusion complexes as the fabric dries.

15

The polyols' ability to remain on the fabric for a longer period of time than water, as the fabric dries, typically allows it to form ternary complexes with the cyclodextrin and some malodorous molecules. The addition of the glycols tends to fill up void space in the cyclodextrin cavity that is unable to be filled by some malodor molecules of relatively smaller sizes. Preferably the glycol used is glycerin, ethylene glycol, propylene glycol, diethylene glycol, dipropylene glycol or mixtures thereof, and more preferably ethylene glycol and/or propylene glycol. Cyclodextrins prepared by processes that result in a level of such polyols are highly desirable, since they can be used without removal of the polyols.

20

Some polyols, e.g., dipropylene glycol, are also useful to facilitate the solubilization of some perfume ingredients in the composition of the present invention.

25

Typically, glycol is added to the composition of the present invention at a level of from about 0.01% to about 3%, by weight of the composition, preferably from about 0.05% to about 1%, more preferably from about 0.1% to about 0.5%, by weight of the composition. The preferred weight ratio of low molecular weight polyol to cyclodextrin is from about 2:1,000 to about 20:100, more preferably from about 3:1,000 to about 15:100, even more preferably from about 5:1,000 to about 10:100, and most preferably from about 1:100 to about 7:100.

30

## 3. METAL SALTS

Optionally, but highly preferred, the present invention can include metallic salts for added odor absorption and/or antimicrobial benefit for the cyclodextrin

solution when cyclodextrin is present. The metallic salts are selected from the group consisting of copper salts, zinc salts, and mixtures thereof.

5           Copper salts have some antimicrobial benefits. Specifically, cupric abietate acts as a fungicide, copper acetate acts as a mildew inhibitor, cupric chloride acts as a fungicide, copper lactate acts as a fungicide, and copper sulfate acts as a germicide. Copper salts also possess some malodor control abilities. See U. S. Pat. No. 3,172,817, Leupold, et al., which discloses deodorizing compositions for treating disposable articles, comprising at least slightly water-soluble salts of acylacetone, including copper salts and zinc salts, all of said 10          patents are incorporated herein by reference.

15          The preferred zinc salts possess malodor control abilities. Zinc has been used most often for its ability to ameliorate malodor, e.g., in mouth wash products, as disclosed in U.S. Pat. Nos. 4,325,939, issued Apr. 20, 1982 and 4,469,674, issued Sept. 4, 1983, to N. B. Shah, et al., all of which are incorporated herein by reference. Highly-ionized and soluble zinc salts such as zinc chloride, provide the best source of zinc ions. Zinc borate functions as a fungistat and a mildew inhibitor, zinc caprylate functions as a fungicide, zinc chloride provides antiseptic and deodorant benefits, zinc ricinoleate functions as a fungicide, zinc sulfate heptahydrate functions as a fungicide and zinc undecylenate functions as a fungistat.

20          Preferably the metallic salts are water-soluble zinc salts, copper salts or mixtures thereof, and more preferably zinc salts, especially  $ZnCl_2$ . These salts are preferably present in the present invention primarily to absorb amine and sulfur-containing compounds that have molecular sizes too small to be effectively complexed with the cyclodextrin molecules. Low molecular weight sulfur-containing materials, e.g., sulfide and mercaptans, are components of many types of malodors, e.g., food odors (garlic, onion), body/perspiration odor, breath odor, etc. Low molecular weight amines are also components of many malodors, e.g., food odors, body odors, urine, etc.

25          When metallic salts are added to the composition of the present invention they are typically present at a level of from about 0.1% to about 10%, preferably from about 0.2% to about 8%, more preferably from about 0.3% to about 5% by weight of the usage composition.

#### **4. SOLUBLE CARBONATE AND/OR BICARBONATE SALTS**

30          Water-soluble alkali metal carbonate and/or bicarbonate salts, such as sodium bicarbonate, potassium bicarbonate, potassium carbonate, cesium

carbonate, sodium carbonate, and mixtures thereof can be added to the composition of the present invention in order to help to control certain acid-type odors. Preferred salts are sodium carbonate monohydrate, potassium carbonate, sodium bicarbonate, potassium bicarbonate, and mixtures thereof. When these salts are added to the composition of the present invention, they are typically present at a level of from about 0.1% to about 5%, preferably from about 0.2% to about 3%, more preferably from about 0.3% to about 2%, by weight of the composition. When these salts are added to the composition of the present invention it is preferably that incompatible metal salts not be present in the invention. Preferably, when these salts are used the composition should be essentially free of zinc and other incompatible metal ions, e.g., Ca, Fe, Ba, etc. which form water-insoluble salts

### 5. ENZYMES

Enzymes can be used to control certain types of malodor, especially malodor from urine and other types of excretions, including regurgitated materials. Proteases are especially desirable. The activity of commercial enzymes depends very much on the type and purity of the enzyme being considered. Enzymes that are water soluble proteases like pepsin, trypsin, ficin, bromelin, papain, rennin, and mixtures thereof are particularly useful.

Enzymes are normally incorporated at levels sufficient to provide up to about 5 mg by weight, preferably from about 0.001 mg to about 3 mg, more preferably from about 0.002 mg to about 1 mg, of active enzyme per gram of the aqueous compositions. Stated otherwise, the aqueous compositions herein can comprise from about 0.0001% to about 0.5%, preferably from about 0.001% to about 0.3%, more preferably from about 0.005% to about 0.2% by weight of a commercial enzyme preparation. Protease enzymes are usually present in such commercial preparations at levels sufficient to provide from 0.0005 to 0.1 Anson units (AU) of activity per gram of aqueous composition.

Nonlimiting examples of suitable, commercially available, water soluble proteases are pepsin, trypsin, ficin, bromelin, papain, rennin, and mixtures thereof. Papain can be isolated, e.g., from papaya latex, and is available commercially in the purified form of up to, e.g., about 80% protein, or cruder, technical grade of much lower activity. Other suitable examples of proteases are the subtilisins which are obtained from particular strains of *B. subtilis* and *B. licheniformis*. Another suitable protease is obtained from a strain of *Bacillus*, having maximum activity throughout the pH range of 8-12, developed and sold by Novo Industries

5 A/S under the registered trade name ESPERASE®. The preparation of this  
enzyme and analogous enzymes is described in British Patent Specification No.  
1,243,784 of Novo. Proteolytic enzymes suitable for removing protein-based  
stains that are commercially available include those sold under the trade names  
10 ALCALASE® and SAVINASE® by Novo Industries A/S (Denmark) and  
MAXATASE® by International Bio-Synthetics, Inc. (The Netherlands). Other  
proteases include Protease A (see European Patent Application 130,756, published  
15 January 9, 1985); Protease B (see European Patent Application Serial No.  
87303761.8, filed April 28, 1987, and European Patent Application 130,756, Bott  
et al, published January 9, 1985); and proteases made by Genencor International,  
10 Inc., according to one or more of the following patents: Caldwell et al, U.S. Patent  
Nos. 5,185,258, 5,204,015 and 5,244,791.

15 A wide range of enzyme materials and means for their incorporation into  
liquid compositions are also disclosed in U.S. Patent 3,553,139, issued January 5,  
1971 to McCarty et al. Enzymes are further disclosed in U.S. Patent 4,101,457,  
Place et al, issued July 18, 1978, and in U.S. Patent 4,507,219, Hughes, issued  
20 March 26, 1985. Other enzyme materials useful for liquid formulations, and their  
incorporation into such formulations, are disclosed in U.S. Patent 4,261,868, Hora  
et al, issued April 14, 1981. Enzymes can be stabilized by various techniques, e.g.,  
those disclosed and exemplified in U.S. Patent 3,600,319, issued August 17, 1971  
25 to Gedge, et al., European Patent Application Publication No. 0 199 405,  
Application No. 86200586.5, published October 29, 1986, Venegas, and in U.S.  
Patent 3,519,570. All of the above patents and applications are incorporated  
herein, at least in pertinent part.

30 Enzyme-polyethylene glycol conjugates are also preferred. Such  
polyethylene glycol (PEG) derivatives of enzymes, wherein the PEG or alkoxy-  
PEG moieties are coupled to the protein molecule through, e.g., secondary amine  
linkages. Suitable derivatization decreases immunogenicity, thus minimizes  
allergic reactions, while still maintaining some enzymatic activity. An example of  
35 protease-PEG's is PEG-subtilisin Carlsberg from *B. licheniformis* coupled to  
methoxy-PEGs through secondary amine linkage, and is available from Sigma-  
Aldrich Corp., St. Louis, Missouri.

## 6. ZEOLITES

35 When the clarity of the solution is not needed, and the solution is not  
sprayed on fabrics, other optional odor absorbing materials, e.g., zeolites and/or

activated carbon, can also be used. A preferred class of zeolites is characterized as "intermediate" silicate/aluminate zeolites. The intermediate zeolites are characterized by  $\text{SiO}_2/\text{AlO}_2$  molar ratios of less than about 10. Preferably the molar ratio of  $\text{SiO}_2/\text{AlO}_2$  ranges from about 2 to about 10. The intermediate zeolites have an advantage over the "high" zeolites. The intermediate zeolites have a higher affinity for amine-type odors, they are more weight efficient for odor absorption because they have a larger surface area, and they are more moisture tolerant and retain more of their odor absorbing capacity in water than the high zeolites. A wide variety of intermediate zeolites suitable for use herein are commercially available as Valfor<sup>®</sup> CP301-68, Valfor<sup>®</sup> 300-63, Valfor<sup>®</sup> CP300-35, and Valfor<sup>®</sup> CP300-56, available from PQ Corporation, and the CBV100<sup>®</sup> series of zeolites from Conteka.

Zeolite materials marketed under the trade name Abscents<sup>®</sup> and Smellrite<sup>®</sup>, available from The Union Carbide Corporation and UOP are also preferred. These materials are typically available as a white powder in the 3-5 micron particle size range. Such materials are preferred over the intermediate zeolites for control of sulfur-containing odors, e.g., thiols, mercaptans.

## 7. ACTIVATED CARBON

The carbon material suitable for use in the present invention is the material well known in commercial practice as an absorbent for organic molecules and/or for air purification purposes. Often, such carbon material is referred to as "activated" carbon or "activated" charcoal. Such carbon is available from commercial sources under such trade names as; Calgon-Type CPG<sup>®</sup>; Type PCB<sup>®</sup>; Type SGL<sup>®</sup>; Type CAL<sup>®</sup>; and Type OL<sup>®</sup>. Activated carbon fibers and cloth may also be used in combination with the compositions and/or articles of manufacture disclosed herein to provide malodor removal and/or freshness benefits. Such activated carbon fibers and fabrics can be acquired from Calgon.

## 8. MIXTURES THEREOF

Mixtures of the optional odor control agents described above are desirable, especially when the mixture provides control over a broader range of odors.

### F. PERFUME

The wrinkle control composition of the present invention can also optionally provide a "scent signal" in the form of a pleasant odor which provides a freshness impression to the treated fabrics. The scent signal can be designed to provide a fleeting perfume scent. When perfume is added as a scent signal, it is

added only at very low levels, e.g., from about 0% to about 0.5%, preferably from about 0.003% to about 0.3%, more preferably from about 0.005% to about 0.2%, by weight of the usage composition.

5                   Perfume can also be added as a more intense odor in product and on fabrics. When stronger levels of perfume are preferred, relatively higher levels of perfume can be added.

10                  Any type of perfume can be incorporated into the composition of the present invention. The preferred perfume ingredients are those suitable for use to apply on fabrics and garments. Typical examples of such preferred ingredients are given in U.S. Pat. 5,445,747, issued Aug. 29, 1995 to Kvietok et al., incorporated herein by reference.

15                  When long lasting fragrance odor on fabrics is desired, it is preferred to use at least an effective amount of perfume ingredients which have a boiling point of about 300°C or higher. Nonlimiting examples of such preferred ingredients are given in U.S. Pat. 5,500,138, issued Mar. 19, 1996 to Bacon et al., incorporated herein by reference. It is also preferred to use materials that can slowly release perfume ingredients after the fabric is treated by the wrinkle control composition of this invention. Examples of materials of this type are given in U.S. Pat. 5,531,910, Severns et al., issued July 2, 1996, said patent being incorporated herein by reference.

20                  When cyclodextrin is present, it is essential that the perfume be added at a level wherein even if all of the perfume in the composition were to complex with the cyclodextrin molecules when cyclodextrin is present, there will still be an effective level of uncomplexed cyclodextrin molecules present in the solution to provide adequate odor control. In order to reserve an effective amount of cyclodextrin molecules for odor control when cyclodextrin is present, perfume is typically present at a level wherein less than about 90% of the cyclodextrin complexes with the perfume, preferably less than about 50% of the cyclodextrin complexes with the perfume, more preferably, less than about 30% of the cyclodextrin complexes with the perfume, and most preferably, less than about 10% of the cyclodextrin complexes with the perfume. The cyclodextrin to perfume weight ratio should be greater than about 5:1 preferably greater than about 8:1, more preferably greater than about 10:1, even more preferably greater than about 20:1, still more preferably greater than 40:1 and most preferably greater than about 70:1.

5 Preferably the perfume is hydrophilic and is composed predominantly of ingredients selected from two groups of ingredients, namely, (a) hydrophilic ingredients having a ClogP of less than about 3.5, more preferably less than about 3.0, and (b) ingredients having significant low detection threshold, and mixtures thereof. Typically, at least about 50%, preferably at least about 60%, more preferably at least about 70%, and most preferably at least about 80% by weight of the perfume is composed of perfume ingredients of the above groups (a) and (b).  
10 For these preferred perfumes, the cyclodextrin to perfume weight ratio is typically of from about 2:1 to about 200:1; preferably from about 4:1 to about 100:1, more preferably from about 6:1 to about 50:1, and even more preferably from about 8:1 to about 30:1.

### 1. HYDROPHILIC PERFUME INGREDIENTS

15 The hydrophilic perfume ingredients are more soluble in water, have less of a tendency to complex with the cyclodextrins, and are more available in the odor absorbing composition than the ingredients of conventional perfumes. The degree of hydrophobicity of a perfume ingredient can be correlated with its octanol/water partition coefficient P. The octanol/water partition coefficient of a perfume ingredient is the ratio between its equilibrium concentration in octanol and in water. A perfume ingredient with a greater partition coefficient P is considered to be more hydrophobic. Conversely, a perfume ingredient with a smaller partition coefficient P is considered to be more hydrophilic. Since the partition coefficients of the perfume ingredients normally have high values, they are more conveniently given in the form of their logarithm to the base 10, logP. Thus the preferred perfume hydrophilic perfume ingredients of this invention have logP of about 3.5 or smaller, preferably of about 3.0 or smaller.  
20  
25

30 The logP of many perfume ingredients have been reported; for example, the Pomona92 database, available from Daylight Chemical Information Systems, Inc. (Daylight CIS), Irvine, California, contains many, along with citations to the original literature. However, the logP values are most conveniently calculated by the "CLOGP" program, also available from Daylight CIS. This program also lists experimental logP values when they are available in the Pomona92 database. The "calculated logP" (ClogP) is determined by the fragment approach of Hansch and Leo (cf., A. Leo, in *Comprehensive Medicinal Chemistry*, Vol. 4, C. Hansch, P. G. Sammens, J. B. Taylor and C. A. Ramsden, Eds., p. 295, Pergamon Press, 1990, incorporated herein by reference). The fragment approach is based on the chemical structure of each perfume ingredient, and takes into account the numbers  
35

and types of atoms, the atom connectivity, and chemical bonding. The ClogP values, which are the most reliable and widely used estimates for this physicochemical property, are used instead of the experimental logP values in the selection of perfume ingredients which are useful in the present invention.

5 Non-limiting examples of the more preferred hydrophilic perfume ingredients are allyl amyl glycolate, allyl caproate, amyl acetate, amyl propionate, anisic aldehyde, anisyl acetate, anisole, benzaldehyde, benzyl acetate, benzyl acetone, benzyl alcohol, benzyl formate, benzyl iso valerate, benzyl propionate, beta gamma hexenol, calone, camphor gum, laevo-carveol, d-carvone, laevo-  
10 carvone, cinnamic alcohol, cinnamyl acetate, cinnamic alcohol, cinnamyl formate, cinnamyl propionate, cis-jasmone, cis-3-hexenyl acetate, coumarin, cuminic alcohol, cuminic aldehyde, Cyclal C, cyclogalbanate, dihydroeuginol, dihydro isojasmonate, dimethyl benzyl carbinol, dimethyl benzyl carbonyl acetate, ethyl acetate, ethyl aceto acetate, ethyl amyl ketone, ethyl anthranilate, ethyl benzoate, ethyl butyrate, ethyl cinnamate, ethyl hexyl ketone, ethyl maltol, ethyl-2-methyl butyrate, ethyl methylphenyl glycidate, ethyl phenyl acetate, ethyl salicylate, ethyl vanillin, eucalyptol, eugenol, eugenyl acetate, eugenyl formate, eugenyl methyl ether, fenchyl alcohol, flor acetate (tricyclo decenyl acetate), fructone, frutene (tricyclo decenyl propionate), geraniol, geranyl oxyacetaldehyde, heliotropin, hexenol, hexenyl acetate, hexyl acetate, hexyl formate, hinokitiol, hydrotropic alcohol, hydroxycitronellal, hydroxycitronellal diethyl acetal, hydroxycitronellol, indole, isoamyl alcohol, iso cyclo citral, isoeugenol, isoeugenyl acetate, isomenthone, isopulegyl acetate, isoquinoline, keone, ligustral, linalool, linalool oxide, linalyl formate, lyral, menthone, methyl acetophenone, methyl amyl ketone, methyl anthranilate, methyl benzoate, methyl benzyl acetate, methyl cinnamate, methyl dihydrojasmonate, methyl eugenol, methyl heptenone, methyl heptine carbonate, methyl heptyl ketone, methyl hexyl ketone, methyl isobut enyl tetrahydropyran, methyl-N-methyl anthranilate, methyl beta naphthyl ketone, methyl phenyl carbonyl acetate, methyl salicylate, nerol, nonalactone, octalactone, octyl alcohol (octanol-2), para-anisic aldehyde, para-cresol, para-cresyl methyl ether, para hydroxy phenyl butanone, para-methoxy acetophenone, para-methyl acetophenone, phenoxy ethanol, phenoxyethyl propionate, phenyl acetaldehyde, phenylacetaldehyde diethyl ether, phenylethyl oxyacetaldehyde, phenyl ethyl acetate, phenyl ethyl alcohol, phenyl ethyl dimethyl carbinol, prenyl acetate, propyl butyrate, pulegone, rose oxide, safrole, terpineol, vanillin, viridine, and mixtures thereof.

Nonlimiting examples of other preferred hydrophilic perfume ingredients which can be used in perfume compositions of this invention are allyl heptooate, amyl benzoate, anethole, benzophenone, carvacrol, citral, citronellol, citronellyl nitrile, cyclohexyl ethyl acetate, cymal, 4-decenal, dihydro isojasmonate, dihydro myrcenol, ethyl methyl phenyl glycidate, fenchyl acetate, florhydral, gamma-nonalactone, geranyl formate, geranyl nitrile, hexenyl isobutyrate, alpha-ionone, isobornyl acetate, isobutyl benzoate, isononyl alcohol, isomenthol, para-isopropyl phenylacetaldehyde, isopulegol, linalyl acetate, 2-methoxy naphthalene, menthyl acetate, methyl chavicol, musk ketone, beta naphthol methyl ether, neral, nonyl aldehyde, phenyl heptanol, phenyl hexanol, terpinyl acetate, Veratrol, yara-yara, and mixtures thereof.

The preferred perfume compositions used in the present invention contain at least 4 different hydrophilic perfume ingredients, preferably at least 5 different hydrophilic perfume ingredients, more preferably at least 6 different hydrophilic perfume ingredients, and even more preferably at least 7 different hydrophilic perfume ingredients. Most common perfume ingredients which are derived from natural sources are composed of a multitude of components. When each such material is used in the formulation of the preferred perfume compositions of the present invention, it is counted as one single ingredient, for the purpose of defining the invention.

## 2. LOW ODOR DETECTION THRESHOLD PERFUME

The odor detection threshold of an odorous material is the lowest vapor concentration of that material which can be olfactorily detected. The odor detection threshold and some odor detection threshold values are discussed in, e.g., "Standardized Human Olfactory Thresholds", M. Devos et al, IRL Press at Oxford University Press, 1990, and "Compilation of Odor and Taste Threshold Values Data", F. A. Fazzalari, editor, ASTM Data Series DS 48A, American Society for Testing and Materials, 1978, both of said publications being incorporated by reference. The use of small amounts of perfume ingredients that have low odor detection threshold values can improve perfume odor character, even though they are not as hydrophilic as perfume ingredients of group (a) which are given hereinabove. Perfume ingredients that do not belong to group (a) above, but have a significantly low detection threshold, useful in the composition of the present invention, are selected from the group consisting of ambrox, bacdanol, benzyl salicylate, butyl anthranilate, cetalox, damascenone, alpha-damascone, gamma-dodecalactone, ebanol, herbavert, cis-3-hexenyl salicylate, alpha-ionone, beta-

5 ionone, alpha-isomethylionone, lilial, methyl nonyl ketone, gamma-undecalactone, undecylenic aldehyde, and mixtures thereof. These materials are preferably present at low levels in addition to the hydrophilic ingredients of group (a), typically less than about 20%, preferably less than about 15%, more preferably less than about 10%, by weight of the total perfume compositions of the present invention. However, only low levels are required to provide an effect.

10 There are also hydrophilic ingredients of group (a) that have a significantly low detection threshold, and are especially useful in the composition of the present invention. Examples of these ingredients are allyl amyl glycolate, anethole, benzyl acetone, calone, cinnamic alcohol, coumarin, cyclogalbanate, Cyclal C, cymal, 4-decenal, dihydro isojasmonate, ethyl anthranilate, ethyl-2-methyl butyrate, ethyl methylphenyl glycidate, ethyl vanillin, eugenol, flor acetate, florhydral, fructone, frutene, heliotropin, keone, indole, iso cyclo citral, isoeugenol, lyral, methyl heptine carbonate, linalool, methyl anthranilate, methyl dihydrojasmonate, methyl 15 isobutetyl tetrahydropyran, methyl beta naphthyl ketone, beta naphthol methyl ether, nerol, para-anisic aldehyde, para hydroxy phenyl butanone, phenyl acetaldehyde, vanillin, and mixtures thereof. Use of low odor detection threshold perfume ingredients minimizes the level of organic material that is released into the atmosphere.

20 **G. ANTIMICROBIAL ACTIVE**

25 Optionally, but preferably, solubilized, water-soluble, antimicrobial preservative can be added to the composition of the present invention because these aqueous products may be prime breeding grounds for certain microorganisms, especially when in aqueous compositions. This drawback can lead to the problem of storage stability of these solutions for any significant length of time. Contamination by certain microorganisms with subsequent microbial growth can result in an unsightly and/or malodorous solution. Because microbial growth in aqueous solutions is highly objectionable when it occurs, it is highly preferable to include a solubilized, water-soluble, antimicrobial preservative, which is effective for inhibiting and/or regulating microbial growth in order to increase 30 storage stability of the preferably clear, aqueous consumer products such as the subject product of this patent.

35 Typical microorganisms that can be found in raw materials for these products and whose growth can be found in the resulting aqueous solutions include bacteria, both Gram (-) and (+). Gram (-) contaminants may include species such as *Escherichia coli* and *Pseudomonas aeruginosa* which may be found in some water sources, and can be introduced during the preparation of these solutions. Other *Pseudomonas* species, such as

5 *P. cepacia*, are typical microbial contaminants in surfactant manufacturing facilities and may readily contaminate packed finished products. Typical other Gram (-) bacterial contaminants may include *Burkholderia*, *Enterobacter* and *Gluconobacter* species., Gram (+) species may include *Bacillus* species e.g. *B. cereus* and *B. sphaericus*; and may also include other Gram (+) such as *Staphylococcus* species, e.g. *S. aureus*.

Fungal contaminants may include *Aspergillus species*.

10 Therefore, it is preferable to use a broad spectrum preservative, e.g., one that is effective on both bacteria (both gram positive and gram negative) and fungi. A limited spectrum preservative, e.g., one that is only effective on a single group of microorganisms, e.g., fungi, can be used in combination with a broad spectrum preservative or other limited spectrum preservatives with complimentary and/or supplementary activity. A mixture of broad spectrum preservatives can also be used. In some cases where a specific group of microbial contaminants is problematic (such as Gram negatives), aminocarboxylate chelators, such as those described hereinbefore, can be used alone or as potentiators in conjunction with other preservatives. These chelators which include, e.g., ethylenediaminetetraacetic acid (EDTA), hydroxyethylenediaminetriacetic acid, diethylenetriaminepentaacetic acid (DTPA), and other aminocarboxylate chelators, and mixtures thereof, and their salts including phosphonates, and mixtures thereof, can increase preservative effectiveness against 15 Gram-negative bacteria, especially *Pseudomonas* species.

20

25 Antimicrobial preservatives useful in the present invention include biocidal compounds, i.e., substances that kill microorganisms, or biostatic compounds, i.e., substances that inhibit and/or regulate the growth of microorganisms. Preferred antimicrobial preservatives are those that are water-soluble and are effective at low levels. Water-soluble preservatives useful in the present invention are those that have a 30 solubility in water of at least about 0.3 g per 100 ml of water, i.e., greater than about 0.3% at room temperature, preferably greater than about 0.5% at room temperature.

35 The water-soluble antimicrobial preservative in the present invention is included at an effective amount. The term "effective amount" as herein defined means a level sufficient to prevent spoilage, or prevent growth of inadvertently added microorganisms in the packaged product, for a specific period of time. In other words, the preservative is not being used to kill microorganisms on the surface onto which the composition is deposited. Instead, it is preferably being used to prevent spoilage of the product solution in order to increase the shelf-life of the composition. Preferred levels of preservative are from about 0.0001% to about 0.5%, more preferably from about 0.0002% to about 0.2%, most preferably from about 0.0003% to about 0.1%, by weight of the usage composition.

5                   The preservative can be any organic preservative material which will not cause damage to fabric appearance, e.g., discoloration, coloration, bleaching. Preferred water-soluble preservatives include organic sulfur compounds, halogenated compounds, cyclic organic nitrogen compounds, low molecular weight aldehydes, quaternary ammonium compounds, dehydroacetic acid, phenyl and phenolic compounds, alcoholic solvents and mixtures thereof.

10                  The following are non-limiting examples of preferred water-soluble preservatives for use in the present invention. A more complete list is found in U.S. Patent 5,714,137, incorporated hereinbefore by reference.

## 1. ORGANIC SULFUR COMPOUNDS

Preferred water-soluble preservatives for use in the present invention are organic sulfur compounds. Some non-limiting examples of organic sulfur compounds suitable for use in the present invention are:

### a) 3-Iothiazolone Compounds

15                  A preferred preservative is an antimicrobial, organic preservative containing 3-isothiazolone groups.

20                  This class of compounds is disclosed in U.S. Pat. No. 4,265,899, Lewis et al., issued May 5, 1981, and incorporated herein by reference. A preferred preservative is a water-soluble mixture of 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-4-isothiazolin-3-one, more preferably a mixture of about 77% 5-chloro-2-methyl-4-isothiazolin-3-one and about 23% 2-methyl-4-isothiazolin-3-one, a broad spectrum preservative available as a 1.5% aqueous solution under the trade name *Kathon*<sup>®</sup> CG by Rohm and Haas Company.

25                  When *Kathon*<sup>®</sup> is used as the preservative in the present invention it is present at a level of from about 0.0001% to about 0.01%, preferably from about 0.0002% to about 0.005%, more preferably from about 0.0003% to about 0.003%, most preferably from about 0.0004% to about 0.002%, by weight of the composition.

30                  Other isothiazolins include 1,2-benzisothiazolin-3-one, available under the trade name *Proxel*<sup>®</sup> products; and 2-methyl-4,5-trimethylene-4-isothiazolin-3-one, available under the trade name *Promexal*<sup>®</sup>. Both *Proxel* and *Promexal* are available from Zeneca. They have stability over a wide pH range (i.e., 4-12). Neither contain active halogen and are not formaldehyde releasing preservatives. Both *Proxel* and *Promexal* are effective against typical Gram negative and positive bacteria, fungi and yeasts when used at a level from about 0.001% to about 0.5%, preferably from about 0.005% to about 0.05%, and most preferably from about 0.01% to about 0.02% by weight of the usage composition.

**b) Sodium Pyrithione**

Another preferred organic sulfur preservative is sodium pyrithione, with water solubility of about 50%. When sodium pyrithione is used as the preservative in the present invention it is typically present at a level of from about 0.0001% to about 0.01%, preferably from about 0.0002% to about 0.005%, more preferably from about 0.0003% to about 0.003%, by weight of the usage composition.

5 Mixtures of the preferred organic sulfur compounds can also be used as the preservative in the present invention.

**2. HALOGENATED COMPOUNDS**

10 Preferred preservatives for use in the present invention are halogenated compounds. Some non-limiting examples of halogenated compounds suitable for use in the present invention are:

15 5-bromo-5-nitro-1,3-dioxane, available under the trade name Bronidox L<sup>®</sup> from Henkel. Bronidox L<sup>®</sup> has a solubility of about 0.46% in water. When Bronidox is used as the preservative in the present invention it is typically present at a level of from about 0.0005% to about 0.02%, preferably from about 0.001% to about 0.01%, by weight of the usage composition;

20 2-bromo-2-nitropropane-1,3-diol, available under the trade name Bronopol<sup>®</sup> from Inolex can be used as the preservative in the present invention. Bronopol has a solubility of about 25% in water. When Bronopol is used as the preservative in the present invention it is typically present at a level of from about 0.002% to about 0.1%, preferably from about 0.005% to about 0.05%, by weight of the usage composition;

25 1,1'-hexamethylene bis(5-(p-chlorophenyl)biguanide), commonly known as chlorhexidine, and its salts, e.g., with acetic and gluconic acids can be used as a preservative in the present invention. The digluconate salt is highly water-soluble, about 70% in water, and the diacetate salt has a solubility of about 1.8% in water. When chlorhexidine is used as the preservative in the present invention it is typically present at a level of from about 0.0001% to about 0.04%, preferably from about 0.0005% to about 0.01%, by weight of the usage composition.

30 1,1,1-Trichloro-2-methylpropan-2-ol, commonly known as chlorobutanol, with water solubility of about 0.8%; a typical effective level of chlorobutanol is from about 0.1% to about 0.5%, by weight of the usage composition.

35 4,4'-(Trimethylenedioxy)bis-(3-bromobenzamidine) diisethionate, or dibromopropamidine, with water solubility of about 50%; when dibromopropamidine is used as the preservative in the present invention it is typically present at a level of from

about 0.0001% to about 0.05%, preferably from about 0.0005% to about 0.01% by weight of the usage composition.

Mixtures of the preferred halogenated compounds can also be used as the preservative in the present invention.

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### 3. CYCLIC ORGANIC NITROGEN COMPOUNDS

Preferred water-soluble preservatives for use in the present invention are cyclic organic nitrogen compounds. Some non-limiting examples of cyclic organic nitrogen compounds suitable for use in the present invention are:

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#### a) Imidazolidinedione Compounds

Preferred preservatives for use in the present invention are imidazolidinedione compounds. Some non-limiting examples of imidazolidinedione compounds suitable for use in the present invention are:

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1,3-bis(hydroxymethyl)-5,5-dimethyl-2,4-imidazolidinedione, commonly known as dimethyloldimethylhydantoin, or DMDM hydantoin, available as, e.g., Glydant<sup>®</sup> from Lonza. DMDM hydantoin has a water solubility of more than 50% in water, and is mainly effective on bacteria. When DMDM hydantoin is used, it is preferable that it be used in combination with a broad spectrum preservative such as Kathon CG<sup>®</sup>, or formaldehyde. A preferred mixture is about a 95:5 DMDM hydantoin to 3-butyl-2-iodopropynylcarbamate mixture, available under the trade name Glydant Plus<sup>®</sup> from Lonza. When Glydant Plus<sup>®</sup> is used as the preservative in the present invention, it is typically present at a level of from about 0.005% to about 0.2% by weight of the usage composition;

20

N-[1,3-bis(hydroxymethyl)2,5-dioxo-4-imidazolidinyl]-N,N'-bis(hydroxymethyl) urea, commonly known as diazolidinyl urea, available under the trade name Germall II<sup>®</sup> from Sutton Laboratories, Inc. (Sutton) can be used as the preservative in the present invention. When Germall II<sup>®</sup> is used as the preservative in the present invention, it is typically present at a level of from about 0.01% to about 0.1% by weight of the usage composition;

25

N,N"-methylenebis{N'-(1-(hydroxymethyl)-2,5-dioxo-4-imidazolidinyl)urea}, commonly known as imidazolidinyl urea, available, e.g., under the trade name Abiol<sup>®</sup> from 3V-Sigma, Unicide U-13<sup>®</sup> from Induchem, Germall 115<sup>®</sup> from (Sutton) can be used as the preservative in the present invention. When imidazolidinyl urea is used as the preservative, it is typically present at a level of from about 0.05% to about 0.2%, by weight of the usage composition.

Mixtures of the preferred imidazolidinedione compounds can also be used as the preservative in the present invention.

**b) Polymethoxy Bicyclic Oxazolidine**

Another preferred water-soluble cyclic organic nitrogen preservative is polymethoxy bicyclic oxazolidine, available under the trade name Nuosept<sup>®</sup> C from Hüls America. When Nuosept<sup>®</sup> C is used as the preservative, it is typically present at a level of from about 0.005% to about 0.1%, by weight of the usage composition.

Mixtures of the preferred cyclic organic nitrogen compounds can also be used as the preservative in the present invention.

**10 4. LOW MOLECULAR WEIGHT ALDEHYDES AND ALCOHOLS**

**a) Formaldehyde**

A preferred preservative for use in the present invention is formaldehyde. Formaldehyde is a broad spectrum preservative which is normally available as formalin which is a 37% aqueous solution of formaldehyde. When formaldehyde is used as the preservative in the present invention, typical levels are from about 0.003% to about 0.2%, preferably from about 0.008% to about 0.1%. more preferably from about 0.01% to about 0.05%, by weight of the usage composition.

**b) Glutaraldehyde**

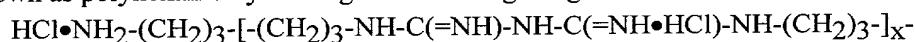
A preferred preservative for use in the present invention is glutaraldehyde. Glutaraldehyde is a water-soluble, broad spectrum preservative commonly available as a 25% or a 50% solution in water. When glutaraldehyde is used as the preservative in the present invention it is typically present at a level of from about 0.005% to about 0.1%, preferably from about 0.01% to about 0.05%, by weight of the usage composition.

**c) Ethanol**

A preferred potentiator or preservative enhancer in this invention may be an alcohol, such as ethanol, an effective amount of solvent, preferably from about 1% to about 15%, more preferably from about 1% to about 10%, most preferably from about 1% to about 5%, by weight of the composition to assist in the drying of the spray product during use and for increased efficacy of the preservative system in the bottled product.

**30 5. QUATERNARY COMPOUNDS**

Preferred preservatives for use in the present invention are cationic and/or quaternary compounds. Such compounds include polyaminopropyl biguanide, also known as polyhexamethylene biguanide having the general formula:



**35**  $(\text{CH}_2)_3 \text{-} \text{NH} \text{-} \text{C}(=\text{NH}) \text{-} \text{NH} \bullet \text{CN}$

Polyaminopropyl biguanide is a water-soluble, broad spectrum preservative which is available as a 20% aqueous solution available under the trade name Cosmocil CQ<sup>®</sup> from ICI Americas, Inc., or under the trade name Mikrokill<sup>®</sup> from Brooks, Inc.

5 1-(3-Chlorallyl)-3,5,7-triaza-1-azoniaadamantane chloride, available, e.g., under the trade name Dowicil 200 from Dow Chemical, is an effective quaternary ammonium preservative; it is freely soluble in water; however, it has the tendency to discolor (yellow), therefore it is not highly preferred.

10 Mixtures of the preferred quaternary ammonium compounds can also be used as the preservative in the present invention.

15 When quaternary ammonium compounds are used as the preservative in the present invention, they are typically present at a level of from about 0.005% to about 0.2%, preferably from about 0.01% to about 0.1%, by weight of the usage composition.

#### **6. DEHYDROACETIC ACID**

20 A preferred preservative for use in the present invention is dehydroacetic acid. Dehydroacetic acid is a broad spectrum preservative preferably in the form of a sodium or a potassium salt so that it is water-soluble. This preservative acts more as a biostatic preservative than a biocidal preservative. When dehydroacetic acid is used as the preservative it is typically used at a level of from about 0.005% to about 0.2%, preferably from about 0.008% to about 0.1%, more preferably from about 0.01% to about 0.05%, by weight of the usage composition.

#### **7. PHENYL AND PHENOLIC COMPOUNDS**

Some non-limiting examples of phenyl and phenolic compounds suitable for use in the present invention are:

25 4,4'-diamidino- $\alpha,\omega$ -diphenoxypyropane diisethionate, commonly known as propamidine isethionate, with water solubility of about 16%; and 4,4'-diamidino- $\alpha,\omega$ -diphenoxypyhexane diisethionate, commonly known as hexamidine isethionate. Typical effective level of these salts is about 0.0002% to about 0.05% by weight of the usage composition.

30 Other examples are benzyl alcohol, with a water solubility of about 4%; 2-phenylethanol, with a water solubility of about 2%; and 2-phenoxyethanol, with a water solubility of about 2.67%; typical effective level of these phenyl and phenoxy alcohol is from about 0.1% to about 0.5%, by weight of the usage composition.

#### **8. AMINOCARBOXYLATE CHELATORS**

35 Chelators, e.g., ethylenediaminetetraacetic acid (EDTA), hydroxyethylene-diaminetriacetic acid, diethylenetriaminepentaacetic acid (DTPA also known commercially as Dequest 2060), aminotri(methylenephosphonic acid) penta sodium salt

(known commercially as Dequest 2006), and other aminocarboxylate chelators, and mixtures thereof, and their salts and phosphonates, and mixtures thereof, can optionally be used to increase antimicrobial and preservative effectiveness against Gram-negative bacteria, especially *Pseudomonas* species. Although sensitivity to EDTA/DTPA and other aminocarboxylate chelators is mainly a characteristic of *Pseudomonas* species, other bacterial species highly susceptible to chelators include *Achromobacter*, *Alcaligenes*, *Azotobacter*, *Escherichia*, *Salmonella*, *Spirillum*, and *Vibrio*. Other groups of organisms also show increased sensitivities to these chelators, including fungi and yeasts. Furthermore, aminocarboxylate chelators can help, e.g., maintaining product clarity, protecting fragrance and perfume components, and preventing rancidity and off odors.

Although these aminocarboxylate chelators may not be potent biocides in their own right, they function as potentiators for improving the performance of other antimicrobials/preservatives in the compositions of the present invention. Aminocarboxylate chelators can potentiate the performance of many of the cationic, anionic, and nonionic antimicrobials/preservatives, phenolic compounds, and isothiazolinones, that are used as antimicrobials/preservatives in the composition of the present invention. Nonlimiting examples of cationic antimicrobials/preservatives potentiated by aminocarboxylate chelators in solutions are chlorhexidine salts (including digluconate, diacetate, and dihydrochloride salts), and Quaternium-15, also known as Dowicil 200, Dowicide Q, Preventol D1, benzalkonium chloride, cetrimonium, myristalkonium chloride, cetylpyridinium chloride, lauryl pyridinium chloride, and the like. Nonlimiting examples of useful anionic antimicrobials/preservatives which are enhanced by aminocarboxylate chelators are sorbic acid and potassium sorbate.

Nonlimiting examples of useful nonionic antimicrobials/preservatives which are potentiated by aminocarboxylate chelators are DMDM hydantoin, phenethyl alcohol, monolaurin, imidazolidinyl urea, and Bronopol (2-bromo-2-nitropropane-1,3-diol).

Examples of useful phenolic antimicrobials/preservatives potentiated by these chelators are chloroxylenol, phenol, tert-butyl hydroxyanisole, salicylic acid, resorcinol, and sodium o-phenyl phenate. Nonlimiting examples of isothiazolinone antimicrobials/preservatives which are enhanced by aminocarboxylate chelators are Kathon, Proxel and Promexal.

The optional chelators are present in the compositions of this invention at levels of, typically, from about 0.01% to about 0.3%, more preferably from about 0.02% to about 0.1%, most preferably from about 0.02% to about 0.05% by weight of the usage compositions to provide antimicrobial efficacy in this invention.

5                   Free, uncomplexed aminocarboxylate chelators are required to potentiate the efficacy of the antimicrobials. Thus, when excess alkaline earth (especially calcium and magnesium) and transitional metals (iron, manganese, copper, and others) are present, free chelators are not available and antimicrobial potentiation is not observed. In the case where significant water hardness or transitional metals are available or where product esthetics require a specified chelator level, higher levels may be required to allow for the availability of free, uncomplexed aminocarboxylate chelators to function as antimicrobial/preservative potentiators.

10                  Bacteriostatic Effects of pH

15                  Bacteriostatic effects can sometimes be obtained for aqueous compositions by adjusting the composition pH to an acid pH, e.g., less than about pH 4, preferably less than about pH 3, or a basic pH, e.g., greater than about 10, preferably greater than about 11. Low pH is a suitable approach for some aspects of the the present invention because the low pH may minimize the potential of bacterial contamination. High pH 10, preferably greater than about 11, also may minimize bacterial and antimicrobial contamination, but is not preferred when optional cyclodextrin is present since the cyclodextrin will be ionized and this will render it less effective to complexing some odor molecules. High pH's can also lead to skin irritaiton. Therefore, aqueous compositions of the present invention should have a pH of from about 3 to about 10, preferably from about 4 to about 8. The pH chosen is consistent with maintaining stability and performance of ingredients in the composition. The pH is typically adjusted with inorganic molecules such as (HCl) or NaOH.

20                  When optional cyclodextrin is present it is preferred to use an antimicrobial that does not significantly complex with cyclodextrin. When optional cyclodextrin is present sufficient anti-microbial should be included to ensure effectiveness.

25                  9. MIXTURES THEREOF

                The preservatives of the present invention can be used in mixtures in order to control a broad range of microorganisms.

H. PROPELLANT

30                  The composition of the present invention can optionally contain propellant. Propellants aid in dispensing product particularly when the composition is used in association with an aerosol containers. Propellants are typically small molecule hydrocarbons which can comprise electronegative moieties such as oxygen or halogens. For some hydrocarbon propellants, the hydrogens are completely replace by other moieties such as halogens. Commercial propellants are often mixtures of such compounds. While chlorofluorocarbons (typically referred to as CFC's) are acceptable

for some aspects of the present invention, CFC's are not preferred due to real and/or perceived negative environmental impact. Propellants acceptable for the present invention will typically have a vapor pressure of less than about 200 psig, more preferably, less than about 150 psig, even more preferably less than about 100 psig, and most preferably less than about 70 psig at 70 °F. Some nonlimiting examples of propellants and propellant products are propane, isobutane, n-butane, 1,1-difluoroethane, 1,1,1,2-tetrafluoroethane, isopentane, n-pentane as well as products and mixtures sold under the Aeron® Tradename all available from CPC International. A full listing of such product is available at the website address [www.diversifiedcpc.com](http://www.diversifiedcpc.com) \*\*\*\*\* (traditional reference) sponsored by Diversified CPC international and these nonlimiting examples are incorporated herein by reference.

### **I. OTHER OPTIONAL INGREDIENTS**

The composition of the present invention can optionally contain other adjunct odor-controlling materials, chelating agents, additional antistatic agents if more static control is desired, insect and moth repelling agents, colorants, especially bluing agents, viscosity control agents, and mixtures thereof in addition to the antiwrinkle ingredients, e.g., polymers. The total level of optional ingredients is preferably less than about 10%, more preferably less than about 5% even more preferably less than about 3%, and still more preferably less than about 2%, by weight of the usage composition. These optional ingredients exclude the other ingredients specifically mentioned hereinbefore. Incorporating adjunct odor-controlling materials can enhance the capacity of the cyclodextrin to control odors as well as broaden the range of odor types and molecule sizes which can be controlled. Such materials include, for example, the metallic salts described hereinbefore, water-soluble cationic and anionic polymers in addition to those already disclosed, zeolites as discussed hereinbefore, water-soluble bicarbonate salts, and mixtures thereof. Other optional materials are salts for viscosity control, antistatic agents, insect or moth repelling agent, optional colorant, optional anti-clogging agent, and mixtures thereof of optional ingredients.

#### **1. OPTIONAL WATER-SOLUBLE POLYIONIC POLYMERS**

Some water-soluble polyionic polymers, e.g., water-soluble cationic polymer and water-soluble anionic polymers in addition to those discussed hereinbefore, can be used in the composition of the present invention to provide additional odor control benefits.

##### **a) Cationic polymers, e.g., polyamines**

Water-soluble cationic polymers, e.g., those containing amino functionalities, amido functionalities, and mixtures thereof, are useful in the present invention to control certain acid-type odors.

**b) Anionic polymers, e.g., polyacrylic acid**

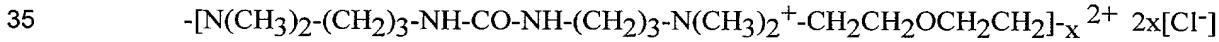
Water-soluble anionic polymers in addition to those described hereinbefore, e.g., polyacrylic acids and their water-soluble salts are useful in the present invention to control certain amine-type odors. Preferred polyacrylic acids and their alkali metal salts have an average molecular weight of less than about 20,000, more preferably less than 10,000, even more preferably from about 500 to about 5,000. Added polymers must not cause the composition to exceed acceptable limits on the Trouton's ratio. Salts are useful viscosity control agents, as disclosed below to use together with polymers to control the Trouton's ratio, if necessary. Polymers containing sulfonic acid groups, phosphoric acid groups, phosphonic acid groups, and their water-soluble salts, and mixtures thereof, and mixtures with carboxylic acid and carboxylate groups, are also suitable. Cross-linked polymers are also useful.

Water-soluble polymers containing both cationic and anionic functionalities are also suitable. Examples of these polymers are given in U.S. Pat. 4,909,986, issued March 20, 1990 to N. Kobayashi and A. Kawazoe, incorporated herein by reference. Another example of water-soluble polymers containing both cationic and anionic functionalities is a copolymer of dimethyldiallyl ammonium chloride and acrylic acid, commercially available under the trade name Merquat 280<sup>®</sup> from Calgon.

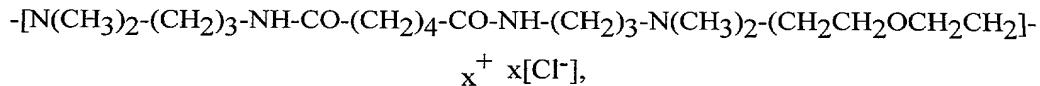
When a water-soluble polymer is used it is typically present at a level of from about 0.001% to about 3%, preferably from about 0.005% to about 2%, more preferably from about 0.01% to about 1%, and even more preferably from about 0.05% to about 0.5%, by weight of the usage composition.

**2. OPTIONAL ANTISTATIC AGENTS**

The composition of the present invention can optionally contain additional effective amounts of other antistatic agent to provide the treated clothes with in-wear static. Preferred antistatic agents are those that are water soluble in at least an effective amount, such that the composition remains a clear solution. Examples of these antistatic agents are monoalkyl cationic quaternary ammonium compounds, e.g., mono(C<sub>10</sub>-C<sub>14</sub> alkyl)trimethyl ammonium halide, such as monolauryl trimethyl ammonium chloride, hydroxycetyl hydroxyethyl dimethyl ammonium chloride, available under the trade name Dehyquart E<sup>®</sup> from Henkel, and ethyl bis(polyethoxy ethanol) alkylammonium ethylsulfate, available under the trade name Variquat 66<sup>®</sup> from Witco Corp., polyethylene glycols, polymeric quaternary ammonium salts, such as polymers conforming to the general formula:



available under the trade name Mirapol A-15<sup>®</sup> from Rhône-Poulenc, and



available under the trade name Mirapol AD-1® from Rhône-Poulenc, quaternized polyethyleneimines, vinylpyrrolidone/methacrylamido-propyltrimethylammonium chloride copolymer, available under the trade name Gafquat HS-100® from GAF; triethonium hydrolyzed collagen ethosulfate, available under the trade name Quat-Pro E® from Maybrook; neutralized sulfonated polystyrene, available, e.g., under the trade name Versa TL-130® from Alco Chemical, neutralized sulfonated styrene/maleic anhydride copolymers, available, e.g., under the trade name Versa TL-4® from Alco Chemical; and mixtures thereof.

It is preferred that a no foaming, or low foaming, agent is used, to avoid foam formation during fabric treatment. It is also preferred that polyethoxylated agents such as polyethylene glycol or Variquat 66® are not used when alpha-cyclodextrin is used. The polyethoxylate groups have a strong affinity to, and readily complex with, alpha-cyclodextrin which in turn depletes the uncomplexed cyclodextrin available for odor control.

When an antistatic agent is used it is typically present at a level of from about 0.05% to about 10%, preferably from about 0.1% to about 5%, more preferably from about 0.3% to about 3%, by weight of the usage composition.

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### 3. OPTIONAL INSECT AND/OR MOTH REPELLING AGENTS

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The composition of the present invention can optionally contain an effective amount of insect and/or moth repelling agents. Typical insect and moth repelling agents are pheromones, such as anti-aggregation pheromones, and other natural and/or synthetic ingredients. Preferred insect and moth repellent agents useful in the composition of the present invention are perfume ingredients, such as citronellol, citronellal, citral, linalool, cedar extract, geranium oil, sandalwood oil, 2-(diethylphenoxy)ethanol, 1-dodecene, etc. Other examples of insect and/or moth repellents useful in the composition of the present invention are disclosed in U.S. Pat. Nos. 4,449,987; 4,693,890; 4,696,676; 4,933,371; 5,030,660; 5,196,200; and in "Semio Activity of Flavor and Fragrance Molecules on Various Insect Species", B.D. Mookherjee et al., published in Bioactive Volatile Compounds from Plants, ASC Symposium Series 525, R. Teranishi, R.G. Buttery, and H. Sugisawa, 1993, pp. 35-48, all of said patents and publications being incorporated herein by reference. When an insect and/or moth repellent is used it is typically present at a level of from about 0.005% to about 3%, by weight of the usage composition.

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#### 4. OPTIONAL COLORANT

Colorants and dyes, especially bluing agents, can be optionally added to the wrinkle control compositions for visual appeal and performance impression. When colorants are used, they are used at extremely low levels to avoid fabric staining.

5 Preferred colorants for use in the present compositions are highly water-soluble dyes, e.g., Liquitint® dyes available from Milliken Chemical Co. Non-limiting examples of suitable dyes are, Liquitint Blue HP®, Liquitint Blue 65®, Liquitint Patent Blue®, Liquitint Royal Blue®, Liquitint Experimental Yellow 8949-43®, Liquitint Green HMC®, Liquitint Yellow II®, and mixtures thereof, preferably Liquitint Blue HP®, Liquitint Blue 65®, Liquitint Patent Blue®, Liquitint Royal Blue®, Liquitint Experimental Yellow 8949-43®, and mixtures thereof.

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#### 5. OPTIONAL ANTI-CLOGGING AGENT

Optional anti-clogging agent which enhances the wetting and anti-clogging properties of the composition, especially when starch is present, is chosen from the group of polymeric glycols of alkanes and olefins having from 2 to about 6, preferably 2 carbon atoms. The anti-clogging agent inhibits the formation of "plugs" in the spray nozzle. An example of the preferred anti-clogging agent is polyethylene glycol having an average molecular weight of from about 800 to about 12,000, more preferably from about 1,400 to about 8,000. When used, the anti-clogging agent is present at a level of from about 0.01% to about 1%, preferably from about 0.05% to about 0.5%, more preferably, from about 0.1% to about 0.3% by weight of the usage composition.

#### 6. VISCOSITY CONTROL AGENT

Optional viscosity control agents, such as electrolytes are useful for lowering viscosity in the present compositions. Not to be bound by theory, but when carboxylic acid polymers have some degree of charge, these can build viscosity via electrostatic repulsion, electrolytes can provide shielding between charges that reduces electrostatic repulsion and thus reduces viscosity.

Inorganic salts suitable for reducing dilution viscosity include MgI<sub>2</sub>, MgBr<sub>2</sub>, MgCl<sub>2</sub>, Mg(NO<sub>3</sub>)<sub>2</sub>, Mg<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>, Mg<sub>2</sub>P<sub>2</sub>O<sub>7</sub>, MgSO<sub>4</sub>, magnesium silicate, NaI, NaBr, NaCl, NaF, Na<sub>3</sub>(PO<sub>4</sub>), NaSO<sub>3</sub>, Na<sub>2</sub>SO<sub>4</sub>, Na<sub>2</sub>SO<sub>3</sub>, NaNO<sub>3</sub>, NaIO<sub>3</sub>, Na<sub>3</sub>(PO<sub>4</sub>), Na<sub>4</sub>P<sub>2</sub>O<sub>7</sub>, sodium silicate, sodium metasilicate, sodium tetrachloroaluminate, sodium tripolyphosphate (STPP), Na<sub>2</sub>Si<sub>3</sub>O<sub>7</sub>, sodium zirconate, CaF<sub>2</sub>, CaCl<sub>2</sub>, CaBr<sub>2</sub>, CaI<sub>2</sub>, CaSO<sub>4</sub>, Ca(NO<sub>3</sub>)<sub>2</sub>, Ca, KI, KBr, KCl, KF, KNO<sub>3</sub>, KIO<sub>3</sub>, K<sub>2</sub>SO<sub>4</sub>, K<sub>2</sub>SO<sub>3</sub>, K<sub>3</sub>(PO<sub>4</sub>), K<sub>4</sub>(P<sub>2</sub>O<sub>7</sub>), potassium pyrosulfate, potassium pyrosulfite, LiI, LiBr, LiCl, LiF, LiNO<sub>3</sub>, AlF<sub>3</sub>, AlCl<sub>3</sub>, AlBr<sub>3</sub>, AlI<sub>3</sub>, Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>, Al(PO<sub>4</sub>), Al(NO<sub>3</sub>)<sub>3</sub>, aluminum silicate; including

hydrates of these salts and including combinations of these salts or salts with mixed cations e.g. potassium alum  $\text{AlK}(\text{SO}_4)_2$  and salts with mixed anions, e.g. potassium tetrachloroaluminate and sodium tetrafluoroaluminate. Salts incorporating cations from groups IIIa, IVa, Va, VIa, VIIa, VIII, Ib, and IIb on the periodic chart with atomic numbers > 13 are also useful in reducing dilution viscosity but less preferred due to their tendency to change oxidation states and thus they can adversely affect the odor or color of the formulation or lower weight efficiency. Salts with cations from group Ia or IIa with atomic numbers > 20 as well as salts with cations from the lanthanide or actinide series are useful in reducing dilution viscosity, but less preferred due to lower weight efficiency or toxicity. Mixtures of above salts are also useful.

Organic salts useful in this invention include, magnesium, sodium, lithium, potassium, zinc, and aluminum salts of the carboxylic acids including formate, acetate, propionate, pelargonate, citrate, gluconate, lactate aromatic acids e.g. benzoates, phenolate and substituted benzoates or phenolates, such as phenolate, salicylate, polyaromatic acids terephthalates, and polyacids e.g. oxylate, adipate, succinate, benzenedicarboxylate, benzenetricarboxylate. Other useful organic salts include carbonate and/or hydrogencarbonate ( $\text{HCO}_3^{-1}$ ) when the pH is suitable, alkyl and aromatic sulfates and sulfonates e.g. sodium methyl sulfate, benzene sulfonates and derivatives such as xylene sulfonate, and amino acids when the pH is suitable. Electrolytes can comprise mixed salts of the above, salts neutralized with mixed cations such as potassium/sodium tartrate, partially neutralized salts such as sodium hydrogen tartrate or potassium hydrogen phthalate, and salts comprising one cation with mixed anions.

Other useful organic salts include amino compounds that be protonated to form cationic salts either prior to addition or in situ such as Tris Amino® (2-amino-2-hydroxymethyl-1,3-propanediol) or AMPD™ (2-amino-2-methyl-1,3-propanediol) Both available from Angus Chemical Company.

Generally, inorganic electrolytes are preferred over organic electrolytes for better weight efficiency and lower costs. Mixtures of inorganic and organic salts can be used. Typical levels of electrolyte in the compositions are less than about 10%. Preferably from about 0.5 % to about 5% by weight, more preferably from about 0.75 % to about 2.5 %, and most preferably from about 1 % to about 2 % by weight of the fabric softener composition.

**J. MIXTURES THEREOF**

5 A variety of mixtures and combinations of optional supplemental wrinkle control agent, optional odor control agent, optional perfume, optional antimicrobial active, optional aminocarboxylate chelator, optional water-soluble polyionic polymer, optional antistatic agent, optional insect repellant, optional colorant, optional anti-clogging agent, can be used in the present polymer compositions.

**II. INFORMATION CONCERNING USE OF WRINKLE  
CONTROL COMPOSITIONS**

10 Information is may be provided to the consumer in the form of instructions. However, other forms and methods of disseminating information may be used and are described in the following sections. Preferably, information will be provided in one or more of these forms via a combination of dissemination methods.

**A. INFORMATION - EDUCATIONAL ELEMENTS**

15 The information provided to the consumer may be described in terms of the educational elements that are disclosed in detail below. This description of essential and optional educational elements is nonlimiting. It should be recognized that the methods of improving the performance of a wrinkle control composition by increasing the education associated with that composition and/or exposing the consumer to other types of optional educational elements, such as information concerning the use of the composition that is 20 not specifically disclosed herein, will improve the performance of the composition and ultimately its acceptance by the consumer.

25 A preferred educational element or information to be provided to the consumer is (1.) a set of instructions that will instruct the consumer on how to improve the performance of the wrinkle composition when the said composition is used by the consumer. Other preferred information or educational elements will comprise, (2.) information that will tend to convince the consumer that the performance of the said 30 composition is authentic, e.g. instill belief, (3.) instructions that teach the consumer on how to incorporate the use of wrinkle control compositions into their daily habits and lifestyles, (4.) instructions concerning the plurality of uses and applications the consumer may employ the composition for, (5.) information concerning the presence of additional benefits other than wrinkle control that may be derived from the use of the compositions, (6.) information identifying the consumer that many members of the household or organization can competently and safely use the wrinkle control composition, and (7.) 35 combinations thereof.

## **1. INSTRUCTIONS FOR PROPER USE OF THE COMPOSITION**

It is surprising to discover that a method for using a wrinkle control composition is not intuitively obvious to the typical consumer. Many consumers apply a less than adequate amount of product, do not achieve adequate distribution, and/or wait for wrinkles to spontaneously disappear. Therefore it has been found that the majority of consumers must be taught how to use the wrinkle control product including, but not limited to, applying appropriate product levels, distributing the product evenly, and manipulating fabrics. Unless the consumer is taught how to use the product properly, it is highly unlikely that the consumer will use the product successfully, and due to their disappointment will not repurchase it. There are a variety of procedural elements that the consumer must learn, including how best to apply the composition, how to shape the garment after applying the composition, what types of clothes respond best to the composition, and when to use the composition, among others.

Surprisingly, methods of using the described compositions to guarantee good wrinkle control performance are not intuitively understood by the consumer. Other product features such as additional non-wrinkle related benefits are also unobvious unless they are shared via instructions that are designed to call them to the consumer's attention. Therefore, an article of manufacture comprising a wrinkle control composition and optionally, but preferably a container including a spray dispenser and a set of instructions unexpectedly raises the value of the product significantly to the consumer vs. a similar article lacking such instructions. The set of instructions can be provided directly on or independent of such a container.

### **a) Instructions for applying a wrinkle control composition**

Instructions for applying a wrinkle control composition provide guidance for applying the composition successfully to achieve good wrinkle control performance. Surprisingly the best way to apply product is not intuitively understood by many consumers. Articulating instructions for applying such a composition and providing these to the consumer in the form of a set of instructions together with a wrinkle control composition raises the value of the product significantly to the consumer vs. a similar article lacking such instructions for use. Methods of use instructions can also be provided independent of a tangible article of use, but rather in conjunction with a recognizable product image (e.g. trademarks, trade dress, trade color, and advertising are nonlimiting examples of recognizable product image).

Methods of application include detailed instructions concerning how to prepare clothes and product prior to application, instructions on the amount of product to apply, procedures for applying the product, procedures for manipulating the fabrics to aid the

wrinkle removal, optional post-treatment procedures, and instructions pertinent to specific types of fabrics.

i) Pre-Application Procedures

Several preparatory steps occur before product is applied to fabrics. Fabrics should be arranged such that the increment of fabric to be treated or preferably, if possible the entire fabric is available for application of the composition. Typically, this is done either by spreading a fabric on a surface or suspending it by hanging it on a hanger or clothelines or similar means. If the fabric is a household fabric, it may be suitable and often desirable to treat the household fabric in its typical environment. For instance, it is preferred to treat curtains as they hang on the door, table clothes as they are spread on a table, bedspreads and sheets as they lay on a bed and pillowcases while they cover pillows. Treating household fabrics in this manner can save the time of removing the fabric treating it and then replacing it. In addition, the treatment of household fabrics in their typical environment is also convenient because it provides a space to hang or spread the fabric. In cases where a fabric will be treated on a surface or while hanging and it is desirable to prevent over spray onto an unintended surface such as floors, table tops, washing machines, walls, etc. In applications where overspray is possible, a material such as a towel or newspaper should be placed underneath the fabric to prevent unintended deposition on surrounding surfaces.

When using a wrinkle control composition that may separate, it is preferred, but not essential to shake the composition before applying to homogenize the contents and guarantee uniform application of actives during use.

ii) Amount of Composition to Apply

An effective amount of a wrinkle control composition of the present invention is applied to fabrics, preferably but not essentially, by spraying as disclosed below. When the composition is apply onto fabric, an effective amount should be deposited onto the fabric, with the fabric becoming damp and for some cases, totally saturated with the composition, at least where the wrinkle exists. In general, lower levels of treatment application are preferred, typically from about 1%, preferably from about 3%, even more preferably 5%, and most preferably from about 7% by weight of the fabric and with higher levels of treatment typically being less than about 300% preferably less than about 150%, more preferably less than about 100%, even more preferably less than about 75%, still more preferably less than about 50%, and most preferably less than about 35% by weight of the fabric. For heavier fabrics or fabrics that are more heavily wrinkled, typically higher levels of treatment are needed to reduce wrinkles.

Although general guidelines above are helpful to understand the range of product application level, many factors affect the specific level of treatment suitable for each fabric, e.g. whether the fabric is wet or dry, whether the fabric is heavy or light and whether the fabric is lightly wrinkled or heavily wrinkled.

5 When dry fabrics are treated with the wrinkle controlling compositions, the amount of the composition that should be used is dependent on several factors including, but not limited to, the weight of the fabric, the type of fabric, and the type of wrinkle in the fabric. Fabrics can have several types of wrinkles. One type of is wrinkle is characterized by its relative depth and sharpness. Such wrinkles are difficult to remove and require a higher level of treatment and more work by the user to remove. When 10 fabrics have such tough to remove wrinkles or the fabric is heavy, wrinkle controlling compositions are typically applied at lower levels of at least about 5% of the weight of the fabric, preferably at least about 7% of the weight of the fabric and at higher levels of typically less than about 300% of the weight of the fabric, preferably less than about 15 15 150% of the weight of the fabric, and most preferably less than about 100% of the weight of the fabric.

Another type of wrinkle is characterized by its broad nature and lack of depth; such wrinkles are often referred to as "bumpiness", "waviness", or "rumples". Such wrinkles are often less difficult to remove than the sharp type of wrinkle discussed above. When fabrics are lighter in weight or have wrinkles that are less difficult to remove 20 typically levels of treatment application are at least about 1% of the weight of the fabric preferably at least about 3% of the weight of the fabric, more preferably at least about 5% of the weight of the fabric, and most preferably about 7% of the weight of the fabric and at higher levels of typically less than about 100% of the weight of the fabric, preferably 25 less than about 50% of the weight of the fabric, more preferably less than about 30% of the weight of the fabric and most preferably less than 25% of the weight of the fabric.

Although it is preferably to treat dry fabrics, wet fabrics can be treated with the wrinkle control composition as well to prevent wrinkling during the drying process, and deliver a softness feel, especially to fabrics that haven't been treated with a fabric softener. Fabrics treated while wet should be manipulated into the desired end 30 conformation after spraying and hung or laid flat to dry. The wrinkle controlling compositions are also useful for wet fabrics when wet fabrics are being line dried.

To reduce the potential for staining, it is always preferable to minimize the total amount of wrinkle controlling composition needed to remove the wrinkles form the 35 fabric.

### iii) Procedures for Applying the Composition

Many different devices and/or implements can be used to apply treatment to fabrics and the use of these devices and/or implement is, at times, dependent on the context. Generally preferred practices for applying the composition include arranging for the source of the composition to be an appropriate distance from the fabric and achieving good distribution. Practices for applying the composition to fabric which are specific to devices used for distribution are disclosed herein below. When applying treatments to fabrics via an aerosol means herein it is recommended to hold the source of the aerosol directed towards the fabric at a distance that is typically at least about 2 inches, preferably at least about 3 inches, more preferably at least about 4 inches, still more preferably at least about 5 inches and most preferably at least about 6 inches from the fabric, while the upper distance from fabric is typically less than about 40 inches preferably less than about 20 inches, more preferably less than about 15 inches, even more preferably less than about 12 inches, even more preferably still less than about 10 inches and most preferably less than about 8.5 inches from the fabric.

More preferably, the wrinkle control composition should be applied in a manner that achieves even coverage over the entire fabric surface. Even coverage and good distribution of the product over the fabric is highly preferred, because this practice reduces drying time, prevents staining, and guarantees that all the wrinkles in a fabric will be treated with the composition. While it is acceptable to treat the overall garment using a discrete distribution action e.g. spray a spot on a fabric and then move to another spot on the fabric and spray, it is much more highly preferably to spray fabrics using a sweeping motion over the fabric to aid maximum spreading and coverage of the wrinkle controlling composition. When using a manual sprayer to treat fabrics it is preferred to sweep horizontally and vertically a few times to achieve even distribution. Using other motions to achieve good distribution such as a circular motion is also acceptable. In the case of a shirt, it is discovered that very specific recommendations such as sweeping while spraying are surprisingly effective in helping the consumer achieve the benefit.

An even distribution can also be conveniently achieved by using a device that provides a continuous stream of aerosol, such as a pressurized or powered sprayers. Pressurized and powered sprayers may also be desired to prevent hand and finger fatigue even though a continuous spray may not be required. When using a continuous spray, a sweeping motion is still useful for achieving a good distribution of the composition, but sweeping should be continuous and rapid when using a continuous spray. When using a continuous spray, employing a circular motion to achieve good distribution is also helpful.

5 While it is typically preferred to attempt to achieve uniform distribution over a garment, there are situations in which a non-uniform distribution is acceptable and even useful. For instance, in areas where more difficult wrinkles exist on the fabrics, it is usually desirable to concentrate a higher dose of wrinkle controlling composition on these wrinkled sites vs. the bulk of the fabric. For garments that have a few lighter wrinkles, it is normally preferable to apply wrinkle controlling compositions generally over these sites. However, it is acceptable to treat only the part of a fabric that will be visible, e.g., the front of a shirt where only the front will be visible since the back will be covered by a jacket.

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a. Distribution via an Aerosol

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For purposes of the present invention an aerosol is defined as liquid droplets distributed in a gaseous carrier, and for purposes of the present invention the liquid to be formed into droplets comprises the wrinkle control composition and the gaseous carrier is air.

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Many devices can be used to produce aerosols including, but not limited to trigger sprayers, pumps, pressurized sprayers, pre-compression sprayers, sprayers fueled by propellant, chambers with mechanical sprayers, steamers, steam irons, paint sprayers, etc. The preferred devices for generating aerosols for the purpose of the present invention are trigger sprayers, pre-compression sprayers, and propellant driven sprays. When using trigger sprayers, it is efficacious to instruct the consumer to pull the triggering mechanism in *full strokes* to aerosolize the product effectively and provide the best distribution on fabrics, while reducing negatives such as sprayer drip and large droplet size.

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When aerosols are used these should provide specific spray distribution, particle size, and other spray characteristics within specific ranges as disclosed herein below.

b. Application via an implement

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A variety of implements can be used to aid in the application of the composition to fabrics. Examples of such implements include rollers, gloves, mitts, brushes, and substrates.

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Substrates are typically used to transfer the said composition to fabrics during the drying process either in domestic or commercial fabric drying equipment. Substrates are defined herein as any item that can releasably contain the composition until such time as the substrate plus said composition is added to the dryer and it comes into contact with the fabrics to be treated with the composition. The substrate releases the composition and transfers it in a controlled fashion such that the composition is evenly distributed across the surfaces of the garments within the dryer.

It should be understood that everyday objects available to the consumer and specially manufactured items are suitable for use as substrates for the purpose of introducing a wrinkle controlling composition into the dryer and transferring the composition to the target fabrics. Available substrates that can be used to deliver wrinkle controlling composition include but are not limited to, cloth diapers, rags, wash clothes, towels, flexible nonwoven sheet or towellete, or sponges. It should also be understood that a substrate can be a manufactured item that is suitable for releasably containing the wrinkle controlling composition to fabrics in the dryer. When used in combination with substrates, the desired amount of the wrinkle controlling composition should be poured directly on the substrate (unless it is already contained within the substrate as an article of manufacture) and the substrate plus the wrinkle controlling composition is then placed in the clothes dryer and the dryer is activated. The dryer temperature should be set according to recommendations given by the fabric manufacturer.

A substrate can be chosen such that it has the capacity to contain the desired level of the said wrinkle controlling composition. Alternately, multiple substrates can be used to deliver the desired amount of wrinkle controlling composition when the amount exceeds the capacity of one substrate. Also, when the batch or load of fabrics is large either in number and/or weight, it is often desirable to use multiple substrates in combination with the wrinkle controlling composition to achieve a more uniform distribution of the wrinkle controlling composition during the tumbling of the fabrics in the dryer. When the wrinkle controlling composition is poured on a fabric or substrate for delivery into the clothes dryer, it is preferred that the item used to deliver the wrinkle controlling composition is clean.

**c) Physical Manipulations for Removing Wrinkles**

Not to be bound by theory, but the removal of wrinkles from fabrics typically requires some form of mechanical force in addition to the chemical energy of the composition. Surprisingly, it is not obvious to consumers that mechanical energy is necessary to remove wrinkles when a wrinkle control composition is applied to fabric. Nor is it self-evident that when mechanical energy is used together with the said wrinkle control composition, that the level of mechanical energy is low or mild compared to typical mechanical energy employed in the wrinkle removal process, such as ironing or pressing. Therefore, it greatly increase the value and everyday convenience of the product to go to extreme measures to communicate this point as transparently as possible to the consumer.

In limited instances, the mechanical force required can be exceptionally low, such as in the force of gravity on a fabric that is being hung from a hanger, clothesline or

similar means or the moderate force achieved by accelerating the fabrics through shaking. More typically the mechanical force required is slightly higher and so it is optional but preferred to apply physical manipulations to the fabric. Often these physical manipulations are most meaningfully described by actions such as stretching, tugging, and smoothing, but these are to be understood as nonlimiting directions for physical manipulations.

### i) Physical Manipulations

After an effective level of treatment is applied to the fabrics, there are several manipulations that can be employed to aid in removing wrinkles. Not to be bound by theory, but some type of mechanical force, in addition to chemical energy imparted by the said composition, is necessary to remove wrinkles from clothing. It is acceptable in limited cases, such as the treating lightweight garments with very light wrinkling, to employ exceeding low mechanical energy, specifically through the application of gravitational force on the fabrics by suspending it or shaking it while suspended. Typically however, at least a moderate level of gentle physical manipulation is desirable to remove wrinkles after treatment. It is preferred to avoid excessive physical manipulation as this may lead to stretching of the garment. Preferred physical manipulations of a treated garment will include pinching, shaking, snapping, pressing, pulling and combinations of these operations. It should be understood that these actions are nonlimiting of the appropriate physical actions that may be used to manipulate the garment or fabric.

Generally physical manipulation of the fabric should occur in at least one direction, preferably perpendicular to the wrinkles, where the direction of the wrinkles can be identified. More preferably, the manipulation of the fabric will occur in at least two directions that are perpendicular. When a direction can not be identified for the wrinkles, it is preferable to gently manipulate the fabric in at least one direction, and more preferably in at least two directions that are perpendicular to each other.

be placed on either side of the fabric and pressed together to provide counter pressure for each other as the hands move along the fabric to stretch and smooth it. Attaching weights to the lower edges of a suspended garment can act as a substitute to smoothing the garment by hand and will provide moderate physical manipulation of the fabric

5                   Fabric manipulation is especially useful on certain areas of fabrics that are designated as challenge areas. Typically, the challenge areas are more difficult to smooth due to the thickness of fabric, seams, interfaces or the presence of intentional creases or pleats that are expected to have sharp appearance. Challenge areas, on garments and fabrics in general, can include the following nonlimiting areas collars, seams, plackets, 10                   hems, ruffles, appliqués, embroidery, various other fabric decorations, areas with interfacing, intentional creases, e.g. in the front of pants, and pleats. Often a more energetic level of fabric manipulation or smoothing is required on challenge areas A nonlimiting type of smoothing action for challenge areas is delivered by pinching fingers together and pulling the area through the fingers when these areas are small as with 15                   collars, etc.

Once the fabric has been sprayed and optionally, but preferably, stretched or smoothed, it is hung until dry or maintained under stress to reduce the reappearance of the wrinkle. The manipulations to remove wrinkles can be performed with the garment hung vertically, e.g., on a clothes hanger or spread on a horizontal surface, such as, a bed, an ironing board, a table surface, and the like. Another method to loosen wrinkles after 20                   treating involves shaking out fabrics with enough energy to loosen wrinkles, in some cases it may be necessary to impart enough energy to cause the fabric to make a snapping noise or motion. The wrinkles could also be manipulated out of the fabric using an implement designed to help smooth the fabrics. Such an implement would be useful in preventing contacts between hands and wrinkle controlling composition, when desired. 25

Many fabrics or garments also contain bends in the fabrics, often termed creases or pleats, that are desirable. Such creases or pleats are often found on the front of pant legs and the sides of sleeves. These can be reinforced while the garment is being shaped to preserve the crease. Creases are reinforced by applying pressure usually by pinching the fabric either with hands, fingers, or an implement and pulling the crease through the 30                   pressure point or by hanging the garment so that it folds at the crease and reinforces it with the pressure of gravity. The fabric should then be laid out flat to dry or hung on a hanger or with some other apparatus such that the fabric will remain smooth while drying. Weights can be attached to critical points on fabrics and garments to aid in maintaining smooth appearance and/or reinforce creases during drying. 35

**d) Post-Treatment Procedures****i) Drying the treated fabric**

Depending on the amount of product used to treat the garment and the weight of the garment, the garment should be dried in air for an upper time of less than about 24 hours, preferably less than about 12 hours, more preferably less than about 6 hours, still more preferably less than about 3 hours, and most preferably equal to or less than about 2 hours and typically the lower limit of drying time is equal to or greater than about 1 minute, preferably greater than about 5 minutes, more preferably equal to or greater than about 10 minutes, still more preferably greater than or equal to about 30 minutes and most preferably greater than or equal to about 60 minutes. It is preferable to let fabrics that were very wet prior to treating with the wrinkle controlling composition dry for longer periods. It is also preferable to let fabrics that are treated with higher amounts of the wrinkle controlling composition dry for longer periods of time. When consumers do have difficulty with lengthy dry times, surprisingly, it is not obvious to them that there are changes in their fabric care habits that can be made to address the dry time problem. Therefore, it is helpful to instruct consumers to change their fabric care habits by choosing garments to wear well ahead of time, preferably the night before wear, to allow adequate dry time. Alternately, consumers can be advised to use less spray and to concentrate application at the most wrinkled sites. Also, consumers can be advised to use the iron, to provide heat energy for drying the fabrics.

It is acceptable to assist the drying, either by heating, or blowing air across the fabric surface, or both. Thus, at times it is desirable to follow the use of wrinkle controlling composition by treating the fabric with an appliance that can help dry the clothes. Nonlimiting examples of such appliances are clothes dryers and hand-held hair dryers. The wrinkle controlling composition, in combination with an appliance, can be used on both dry or wet fabrics. For instance, the wrinkle controlling composition can be used in combination with a clothes dryer to remove wrinkles from single fabrics or garments as well as batches, or loads, of fabrics and garments. Drying with low-heat or cool air is preferred for fabrics that normally have a tendency to shrink, such as wool, silk, rayon, and the like.

A hand-held hair dryer can be used to increase the speed of drying of individual fabrics. It is preferably to use the hand-held hair dryer on fabrics that are not very wet since it can be time consuming to dry fabrics with such an appliance. Therefore, it is preferable to employ this method on fabrics that were treated in a dry state.

When using a hand-held hair dryer, the wrinkle controlling composition should be applied evenly over fabrics using the minimal amount of wrinkle controlling

composition necessary. Preferably, the fabric is manipulated as described above to remove wrinkles prior to drying with the hand-held hair dryer. The hand-held dryer is turned on either low, medium, or high heat, preferably medium or high heat and the air stream is applied evenly over the fabrics until the fabrics are dry. However, care should be taken to preferably use low-heat and/or cool air to dry fabrics that are prone to shrinkage, such as, wool, silk, rayon, and the like, especially when the fabrics are reaching the point of drying completely. After drying the fabric should be placed in a configuration that will maintain its smoothness until use.

ii) Ironing

10 Ironing is a process that is typically used when consumers prefer a more pressed look. Ironing is also a useful way to apply physical manipulation and drying in a single activity. There are consumers who prefer a pressed look on all garments, but many consumers distinguish between ‘casual’ clothes and ‘formal’ clothes. Consumers who distinguish sharply between casual clothes and formal or dress clothes often want a more pressed appearance for the formal or dress clothes that would include extremely smooth surfaces and very sharp creases and pleats where it is perceived creases and pleats are necessary for the finished look of the garment. When a more pressed look is desired, the consumer is instructed to use the wrinkle control compositions together with ironing to achieve the best execution of the desired formal look.

Employing a wrinkle control composition together with ironing reduces work involved with ironing and improves outcome vs. current ironing aids, especially ironing aids that are primarily starch. Spraying the fabrics with said wrinkle control compositions plasticizes the fibers making it easier to remove the wrinkles with ironing. Certain preferred wrinkle control composition, particularly those containing optional shape retention polymer and optional silicone, particularly certain silicone polyethers, provide a much better end feel to the fabrics, especially vs. starch-based formulations, while delivering the ultra smooth and sharp appearance of starch. Surprisingly, consumers do not expect fabrics that look sharp and smooth, similar to the appearance of starched garments, will also feel soft and silky as is achieved with some preferred compositions. Therefore, this potential benefit is unobvious and instructing the consumer of its existence is essential to increasing the value of these compositions as ironing aids.

When used together with ironing, the wrinkle controlling composition is preferably applied to fabrics prior to ironing. A preferred way to deliver the wrinkle controlling composition to the fabrics is by spraying. The wrinkle controlling composition can also be delivered by employing a through-the-dryer method as

articulated above. Alternatively, in some embodiments, it is acceptable to deliver the wrinkle controlling composition through the iron concurrent with the ironing process. The iron should be set to a temperature appropriate for ironing the fabric. The wrinkle controlling compositions aid in "plasticizing" the fibers and thus reduce the time and effort involved in ironing wrinkles out of fabrics. In general, the wrinkle controlling composition described herein should be used in a way similar to other ironing aids. After ironing, the fabric should be placed in a configuration that will maintain its smoothness as discussed above.

5 **e) Instructions for use on Specific Fabrics**

10 It is not obvious to consumers how these compositions should be used with different fabrics. Therefore, it is useful to disclose such methods of use as instructions to the consumer. Such instructions raise the value of a product to the consumer. Wrinkle control compositions are useful for both casual and formal clothing. Some nonlimiting examples of casual clothing include: polos, khakis, T-shirts, jeans, knit wear, sweaters, 15 etc. This product is also useful for formal clothes including, but not limited to: dresses, jackets, dress shirts, slacks, skirts, etc. Other clothes that will benefit from the use of these compositions will include uniforms, especially school or work related uniforms.

20 As articulated herein above, many consumers make a distinction between casual clothes and formal or dress clothes. In line with this distinction, consumer want these clothes to have different appearances. Therefore, consumers often put the extra effort into ironing formal or dress clothes to get the smooth sharp appearance desired in these garments as disclosed above. However, consumers will also often iron casual clothes or 25 knits to attain a smooth look, but also be dissatisfied with the outcome because ironing will squish, smash, and damage the garment fibers. While this may not be apparent on formal clothes, which tend to be tightly woven, the damage done to fibers is often very apparent on knits, sweaters, and other garments with loose weaves. Many loosely woven fabrics have a fluffiness and quality of drape that consumers appreciate and value. These loosely woven fabrics also often have finishes that can be described as 'sheen'. When 30 such garments are ironed, the fibers are smashed and stiffened and the qualities of fluffiness and drape are lost to a significant degree, since the fiber has been stripped of its natural properties by ironing. Therefore, wrinkle control compositions are highly valued by consumers as an alternate way to impart a smooth, finished appearance to knits, 35 sweaters, and other loosely woven and casual garments while still, surprisingly maintain and even reinforce the natural qualities of the fiber that lead to desirable attributes such as fluffiness, drape, and sheen.

When treating silk or rayon fabrics that are labeled "Dry Clean Only", this should be done with compositions and devices that enable the finest and most well distributed product application possible to avoid staining as such fabrics are typically highly sensitive to staining and will stain even on contact with water, if the water is not excessively well distributed.

If any fabrics become stained these should be washed according to instructions provided by the manufacturer of the fabric to remove the stain. While it is acceptable to use compositions herein on many synthetic garments, the product is especially effective on fabrics that contain a majority of natural fibers, e.g. the product is more effective on fabrics containing 100% cotton or 65% cotton / 35% polyester vs. fabrics containing 35% cotton / 65% polyester. The said compositions are also very effective on other fabrics and blends containing natural or slightly altered natural fibers that absorb water such as rayon, wool, silk, etc.

Many household fabrics can be treated with the wrinkle controlling composition while these household fabrics are residing in their typical environment. For instance, fabric shower curtains and window curtains can be treated while hanging on the rods, bed spreads, quilts, sheets, ruffles, and dusters can be treated while on a bed, and table linens can be treated while on the table. Spraying is a preferred method for treating fabrics residing in their typical environment. In these cases, reasonable care should be taken to avoid staining the environment around the fabric. In many cases spraying household fabrics in their natural environment can replace time consuming, costly, inconvenient, or undesirable processes. For instance, shower curtains are often de-wrinkled by using the bathroom plumbing to generate a large quantity of steam. Spraying wrinkle controlling composition on the shower curtains eliminates the need to waste a large quantity of water producing steam, the potentially undesirable effects of steam on other elements of the bathroom (e.g., wall covers may peel), and the inconvenience of having to close the bathroom to use for a certain period of time. Spraying wrinkle controlling composition on curtains and bed clothes eliminates the often awkward and time consuming job of trying to iron large, irregular items; a process (e.g. ironing) that often results in accidentally generating even deeper more obvious and harder-to-remove wrinkles, as the user struggles to control both the large, irregularly shaped fabric and the iron. Thus, treating household fabrics as they hang in place with wrinkle controlling composition often minimizes frustration and struggle. It is especially desirable to dispense wrinkle removal compositions from a powered sprayer as disclosed above to further improve the performance and convenience.

## **2. EXPECTATIONS OF TREATMENT**

Very surprisingly, many consumers have difficulty understanding and accepting that a wrinkle control composition will work. Not to be bound by theory, but consumers have accepted wrinkles for so long as an inevitable part of life that they now believe wrinkle removal requires a significant investment of time and a good degree of work. Consumers have significant difficulty accepting that a simple wrinkle control composition can actually work for them, despite the fact that there are currently several wrinkle control compositions on the market. This demonstrates very strongly that consumers must first be taught that the wrinkle control composition is effective before they will incorporate its use in their daily lives. A highly preferred educational element is to teach consumers that wrinkle control compositions are effective in removing and/or controlling wrinkles in fabric without the application of heat.

## **3. INSTRUCTIONS FOR INCORPORATING PRODUCT INTO DAILY HABITS AND LIFESTYLES**

Previously, wrinkle control compositions, due to cost and inconvenience, have been reserved for special or occasional use, thus confining the business to a small niche business. It is an aim of the present invention to educate consumers in the ways that an affordable wrinkle control composition can be incorporated into everyday use.

A variety of daily use opportunities are articulated at several points herein and particularly in methods of use. A few nonlimiting examples are articulated here. For example, a consumer may not consider, unless told, that it is advantageous to choose fabrics well ahead of the intended time for use in order to provide time for the fabrics to dry before use. A consumer may not consider, unless told that the product provides an opportunity to dewrinkle and refresh used fabrics for reuse as a substitute for laundry processes and thereby extending the useful life of such fabrics. Consumers may not recognize that the use of such compositions reduces the cost and requirements for maintaining clothes in a presentable state, thereby enlarging the selection of clothes the consumer is willing to purchase. Likewise, consumers realize the composition is safe for use by many members of the consumers' domicile or organization, including those with physical challenges, the elderly, the handicapped, children, youth, students, etc. as more fully disclosed below which enables most everyone in the household to de-wrinkle their own clothes. A consumer may not consider the variety and breadth of fabrics the composition can be used for such as work or school uniforms. A consumer may not consider the opportunity to dewrinkle and refresh fabrics which are stored improperly, unless told.

5 Since consumers have a variety of lifestyles and habits it is helpful to expose consumers to a variety of methods of using the product, so that they may find one that is suitable for them. However, when the habits of a consumer or consumer group are well known it is useful to focus a presentation on methods of use to communicate directly to that consumer.

#### 4. USES AND APPLICATIONS OF WRINKLE CONTROL COMPOSITIONS

10 Surprisingly, consumers typically only purchase wrinkle control spray compositions for special or occasional use, e.g. going on trips. It is more likely that the consumer will incorporate the use of a wrinkle control composition into their everyday life when they are taught a plurality of uses and applications.

15 Nonlimiting examples of fabric articles on which these types of compositions may be used include clothing such as shirts, pants, school uniforms, dresses, skirts and the like, and household fabrics such as draperies, napkins, table clothes, bed linens such as sheets, pillowcases, and comforters.

20 Non-limiting examples of applications or use situations for these compositions include treating clothes that have been lightly worn and are more wrinkled than soiled such that they can be refreshed and dewrinkled without having to go through a laundry process prior to rewear. A similar rewear process can be used with drycleanables to reduce the number of times these fabrics need to be drycleaned. Further, fabrics that have been in storage may be treated to remove wrinkles so that these fabrics do not have to be put through a laundry process prior to wear or usage. Reducing the number of times a fabric needs to be cleaned or laundered will lengthen the lifetime of the fabric. This benefit is not obvious to the consumer and must be taught for it to be realized and experienced. A final touch-up of clothing such as school uniforms, work, and dress clothes shortly prior to wear may also be accomplished with the use of the present composition.

25 A wrinkle control composition useful in the methods of the present invention has a variety of modes of use. While such a composition is exceptionally effective together with the typical laundry processes it is also a surprisingly useful alternative to typical laundry processes. Typical, nonlimiting examples of "laundry processes" include, but are not limited to the processes of dry cleaning, laundering in an automatic washing machine, professional or commercial laundering, steam cleaning, hand washing, professional or commercial pressing, home ironing, line drying, air drying, drying in an automatic clothes dryer, drying with a fan, drying with a hand held hair dryer or blow dryer etc.

**a) Commerical Uses and Applications**

The wrinkle control compositions useful in the methods of the present invention may be used in commercial and institutional settings as well as in domestic settings. A nonlimiting list of commercial and institutional settings wherein the composition finds use includes commercial laundry and dry cleaning operations, hotels, motels, clothing retailers, resorts, spas, cruise ships, hair salons, beauty salons, fabric stores, tailor or alterations businesses, hospitals, day care centers, assisted living centers, uniform manufacture and rental business, businesses catering to the physically active such as sports equipment retailers, ahtletic clubs, gyms, fitness and workout centers, academic settings, especially college campuses, camping and adventure outfitters, travel agencies, car rental agencies, and automotive product stores. Consumers should be made aware of these uses and the versatility of such wrinkle control compositions in commercial operations.

More specifically, the wrinkle control compositions described herein are useful as finishing compositions or 'pressing aids' for commercial drycleaners, or commercial laundries that provide cleaning and fabric care services. Within the drycleaning or commercial laundry contexts, compositions may be used to provide body, a smooth appearance while maintaining the soft, silky feel of the fabric, dewrinkling without loss of qualities of drape, fluffiness and sheen. Further, the described compositions may act to replace some processes such as pressing garments by providing a more acceptable end point to the consumer, namely, a de-wrinkled, but fluffy garments.

Institutions that provide lodging or caretaking such as hotels, motels, hospitals, hospices, dormitories, assisted living, and day care facilities may provide the composition to customers, staff, or residents, in lieu of devices that are normally used in typical laundry processes such as irons, washing machines, or dryers. In many settings disclosed above, typical laundry process equipment is a nuisance or even a hazard to individuals and wrinkle control compositions that do not require the application of heat to cure or otherwise activate the wrinkle controlling effect provide a useful alternative to frequently treating fabrics via typical laundry processes.

Department and clothing retailers can also use the described compositions to treat fabrics and garments to improve the look and value of salable wares. In addition, such retailers may provide such compositions to their consumers or to treat salable wares after purchase to improve appearance as a goodwill gesture to their consumers.

**b) In-home uses and applications**

i) Use of Wrinkle Control Compositions for Fabric Appearance Finishing

When a wrinkle control composition is used for finishing the fabric appearance, such usage generally occurs at some point after the fabric has been laundered and before the fabric is used for the first time. In order to provide clarity with respect to the fabric appearance finishing process, clothing will be used as a specific example. However, it will be understood that for the purposes of the present invention, appearance finishing can apply to any other fabrics in addition to clothing.

It is preferable to treat fabrics with a wrinkle controlling composition prior to wearing the fabrics because although typical laundry processes do an adequate job of removing wrinkles, these processes typically do not completely remove wrinkles nor do these processes prevent wrinkles that may occur during storage prior to wear. The ways in which clothes are handled and stored between domestic and commercial cleaning and fabric care processes often leads to reintroduction of wrinkles prior to the first wearing of the garment. Several handling situations that can lead to re-wrinkling, include, but are not limited to storage in closets, or cabinets, clothes left in an unfolded state in any container or space, such as in laundry baskets, in dryers, on tables, on floors, in drawers, or on beds, storage in containers, especially when tightly packed containers such as in suitcases for trips or storage, storage in trunks, and storage in crowded drawers or other crowded or cramped environments.

Typically, any situation where clothes are stored for a length of time leads to a resurgence of wrinkles. Rewrinking can occur whenever the clothes are under any amount of compression, even where the compression is only due to the weight of the fabric and the action of gravity on the garment. Previous methods for removing resurgent wrinkles in such instances required running the clothes through domestic or commercial processes which consumes time and resources and can be very aggravating since it is essentially rework. Surprisingly, it has been discovered that the use of a wrinkle composition provides a quick, inexpensive solution to the ongoing problem of poor fabric handling and storage that leads to wrinkle resurgence after laundry processes.

In addition to the reintroduction of wrinkles, storage can also lead to musty or off odors in the clothing. An additional benefit of treating stored fabrics with wrinkle control compositions, especially such compositions that contain perfume and/or odor control agent, is the fact that the odor of garment is refreshed.

ii) Use of Wrinkle Control Composition for Garment Rewear

Rewear is defined herein as wearing clothing multiple times before subjecting the clothing to a domestic or commercial cleaning process. Many consumers practice this rewear habit. Also, it has been discovered that while the habit is practiced for good reasons, the current state of the habit, or the way the habit is currently practiced by the consumer has some undesirable elements. The many reasons for practicing rewear include, but are not limited to, 1) a desire to preserve the integrity, look, color sheen, and general newness of a fabric, e.g. lengthen the lifetime of a fabric since cleaning processes and fabric care processes (e.g. ironing) often lead to fabric damage, 2) saving the time required to clean fabrics after each wear, and 3) saving the cost associated with cleaning and various fabric care processes. Since the wrinkle controlling compositions can be used to enable and encourage the rewear habit among a variety of consumers, treating fabrics with wrinkle controlling compositions has been found to be an unobvious and surprising alternative to typical domestic and commercial cleaning and fabric care processes.

Consumers will wear a garment that has been worn before, even if the appearance and odor of the garment are less than optimal. Typically, consumers will only rewear clothing that has been lightly worn before and usually only if the clothing does not have obvious spots and/or stains to signal that it has been worn before.

20 However, consumers find this practice less than optimal since most garments will have wrinkles from being worn before. In addition, the garment is likely to have some residual odor from previous wear. Many consumers believe that a garment is not 'ready-to-wear' if it has wrinkles. Therefore, it has been found that wrinkle controlling compositions provide a solution to an unobvious problem in a heretofore unrecognized consumer habit. Wrinkle control compositions can provide the needed level of wrinkle removal and odor removal to provide the consumer with a significantly more acceptable outcome to support their rewear habit.

25

Also, there are consumers who wish to practice the rewear habit, but do not because these consumers feel very uncomfortable wearing clothes that have even a minor level of wrinkling. Such consumers feel strongly that a garment is not 'ready to wear' if it is even lightly wrinkled and will send a lightly wrinkled garment back through laundry processes. Even if the garment has no residual odor and they do not believe it is dirty, if the garment is even lightly wrinkled such consumers may find the garment unacceptable for rewear. To these consumers, even if the fabric is not dirty, others will perceive it as unclean due to the wrinkling and these consumers will feel their image and status in the eyes of others suffers as a results of wearing garments that may be perceived as unclean.

5        This is true of virtually all consumers with respect to clothing that is worn for business or more formal social occasions. For such consumers, a wrinkle controlling composition can relieve a tremendous burden of work associated with keeping clothes continually looking ready-to-wear, fresh, and clean. Enabling the rewear habit is also particularly useful together with garments that must be worn multiple times during a certain period, such as uniforms, and especially school uniforms.

10      Wrinkle controlling compositions, surprisingly, extend the usable lifetime of clothing items and the lifetime of the appearance of the clothing by reducing the number of times the fabric will be subjected to the harsh laundry processes that lead to fabric damage and appearance reduction. By enabling the consumer to rewear clothing more frequently without laundering, less damage occurs to the clothing item over a given period of time. Less laundering results in less damage to the fibers and the appearance of the clothing item is maintained for a longer period of time.

15      Therefore, in a further process aspect of the present invention, a method for extending the useful life of clothing items is provided. As used herein, the "useful life" of a clothing item refers to the period of time a consumer would have used and worn a given clothing item before replacing it because of the degradation to the appearance and/or feel of the item that results from the incremental damage caused by repeated launderings of the item. As used herein, "incremental damage" or fiber damage resulting from the repeated washing or laundering of clothing items is intended to refer to the degradation or damage to fabric fiber attributes such as texture, sheen, color, and any other visual, tactile or olfactory sensed feature that initially made the clothing item appealing to the consumer.

20      The method comprises the step of providing a wrinkle control composition that is capable of controlling wrinkles in fabrics without the application of heat and without subjecting the clothing to a laundering process that would otherwise tend to cause an incremental measure of damage to the fabric fibers during laundering. The compositions for use in such a method will contain water and optionally, but preferably, a perfume and/or odor control agent amongst other optional materials. A more detailed description of the compositions that are useful in the methods of the present invention have been provided above.

25      In addition, the method comprises the step of providing information to the consumer concerning the use of the composition, preferably, the use of the composition to enable the rewear of previously worn clothing items as a means for extending the useful life of such items. A detailed description of the information that is to be provided and the manner in which that information can be disseminated are also provided herein.

5            Within the context of laundry processes, the wrinkle control composition has many uses. Wrinkle control compositions can be used within the home dryer (or a commercial dryer in a Laundromat), together with the iron as an ironing aid, within a fabric care chamber, and together with a steamer and other miscellaneous fabric care devices.

10            iii) Use of composition with typical domestic cleaning and fabric care processes

15            For the purposes of this section concerning typical domestic laundry processes, there is no distinction between processes performed in the consumers' domicile and processes performed by the consumer at commercial facilities, such as a laundromat.

20            Methods for Use with the Dryer

25            These compositions can be applied to fabrics in a clothes dryer by many means. For instance, the wrinkle controlling composition can be sprayed onto fabrics or garments prior to adding them to the dryer, sprayed on fabrics or garments while the fabrics or garments are in the dryer, poured directly on the batch of garments and fabrics, or poured onto one of the fabrics or garments that is added to the dryer. The wrinkle controlling composition can also be sprayed onto the fabrics in the dryer by a device that is part of the dryer or attached to it. Although there are a variety of acceptable approaches to achieve introduction of the said composition into the dryer, even distribution of the wrinkle control composition is critical to achieving the best performance and so the approaches that achieve the most uniform distribution are preferred.

30            Processes and implements that aid in good distribution in the dryer are preferred. One method for use within the dryer is to spray product composition evenly over a fabric or bundle of fabrics, place these items in a dryer, set the dryer at an appropriate setting as recommended by the manufacturers of the fabrics and when the fabrics are dried immediately remove them and manipulate the fabric into the desired conformation either as it is hanging or as it is laying on a surface. Allow the fabric to remain in this conformation for at least about 10 minutes. Other process for treating fabrics with wrinkle control composition while in the dryer including applying composition as an aerosol while in the dryer and/or using various implements to distribute the wrinkle control composition during tumbling. Implements may include, but are not limited to a variety of substrates.

35            To provide enable good distribution when composition is applied within the dryer, it is preferred, to use smaller bundle sizes with typical sizes below about 15 lbs (about 6.8 kg), preferably below about 10 lbs (about 4.5 kg), more preferably below about 8 lbs.(about 3.6 kg), even more preferably below about 6 lbs. (about 2.7 kg) and most preferably at or below about 4 lbs. (about 1.8 kg) It is also desirable to arrange the

bundle composition such that fabrics in the bundle have similar weights or densities to promote even distribution. When a substrate is used it is also desirable for each substrate plus wrinkle controlling composition to have a weight or density similar to the fabrics in the bundle to facilitate even distribution. Therefore, in cases where larger bundles are treated, it is preferable to use a larger substrate or multiple substrates. However, where a larger substrate has a significantly different weight and/or density relative the fabric items to be treated, it is preferred to have multiple smaller substrates so that the weight and/or density of each substrate is more similar to that of the clothes, thereby facilitating the distribution of the wrinkle control composition.

When treating fabrics in the clothes dryer the amount of wrinkle controlling composition used is dependent on the size of the load of fabrics. For a 4 lbs. bundle of fabrics, wrinkle controlling compositions should be used typically at lower levels of least about 10 g, preferably at least about 20 g, even more preferably at least about 30 g, still more preferably at least about 50 g, and most preferably about 66 g, and at an upper level of equal to or less than about 3000 g, preferably equal to or less than about 1500g, more preferably equal to or less than about 750g, still more preferably equal to or less than about 500 g and most preferably equal to or less than about 100 g. When the bundle size is greater than about 4 lbs., higher amounts of wrinkle controlling composition are appropriate and when the bundle size is smaller than about 4 lbs. (about 1.8 kg) lower amounts of wrinkle controlling composition are appropriate. When the wrinkle controlling composition is provided together with a substrate as an article of manufacture, more than one article can be used where a greater amount of wrinkle control composition is needed.

Total drying time is typically set at a lower limit of at least about 1 minute, preferably about 2 minutes, more preferably about 3 minutes, even more preferably about 5 minutes and most preferably about 7 minutes and with an upper limit set at about 60 minutes, preferably 45 minutes, more preferably 30 minutes even more preferably about 20 minutes and still more preferably about 15 minutes and most preferably about 10 minutes. Preferably fabrics are still at least slightly damp when removed from the dryer.

Garments and fabrics should be removed as soon as possible, preferably immediately, following the drying cycle and arranged to maintain the smooth appearance of the fabrics with for instance, but not limited to, arranging sleeves, collars, pant legs so these are smooth and not twisted in any way, hanging the fabric on a hanger, laying the fabric flat or putting it to its intended use to maintain its appearance e.g. hanging curtains, putting bed linens on a bed, placing table linens on a table. Preferably the fabric will not be folded and stored until it is completely dry.

Methods for Use with the Iron

Methods for use with the iron are disclosed herein above.

Methods for Use with Fabric Treatment Chambers

In another aspect of the present invention, the composition can be sprayed onto fabrics in an in-home de-wrinkling chamber containing the fabric to be de-wrinkled and/or optionally deodorized, thereby providing ease of operation. Conventional personal as well as industrial deodorizing and/or de-wrinkling apparatuses are suitable for use herein. Traditionally, these apparatuses act by a steaming process which effects a relaxation of the fibers. Examples of home dewrinkling chambers include shower stalls. The spraying of the composition or compounds onto the fabrics can then occur within the chamber of the apparatus or before placing the fabrics into the chamber. The spraying means should preferably be capable of providing droplets with a weight average diameter of from about 8 to about 100  $\mu\text{m}$ , preferably from about 10 to about 50  $\mu\text{m}$ . When treatment occurs within a chamber preferably, the loading of moisture on fabrics made of natural and synthetic fibers is from about 5 to about 25%, more preferably from about 5 to about 10% by weight of the dried fabric. Other conventional steps that can be carried out in the dewrinkling apparatus can be applied such as heating and drying. Preferably, for optimum dewrinkling benefit, the temperature profile inside the chamber ranges from about 40°C to about 80°C, more preferably from about 50°C to about 70°C. The preferred length of the drying cycle is from about 15 to about 60 minutes, more preferably from about 20 to about 45 minutes.

The steaming step in the dewrinkling apparatus can also be eliminated while obtaining the benefits, if the composition is maintained within a temperature range from about 22°C (about 72°F) to about 76°C (about 170°F) before spraying.

Methods for Use Together with Miscellaneous Apparatus for Treating Fabrics

Rollers, gloves, mitts, mats, steamers, swivel head hangers, showers, and shower heads are nonlimiting examples of implements that are useful in combination with said compositions to apply compositions, to improve the physical manipulation of the treated fabrics, thereby improving the performance and/or improve the overall usage experience.

Rollers, gloves and mitts can all be used to apply product, either by incorporating product into these implements or by applying product to the implement and then applying it to the fabrics. Rollers, gloves, and mitts, can also be used for smoothing actions, to improve de-wrinkling performance and experience. Consumers who do not want to contact the compositions with their hands will also have protection using these devices. Some consumers will also apply more pressure when using an implement and thereby, get a better outcome.

Said composition can be incorporated into a steamer and then applied to fabrics using typical settings on these devices to generate steam.

5 Showers and shower heads can be used to apply the composition to fabrics, conveniently in the bathroom where the bathtub or shower stall can capture over spray. Composition can be loaded into a removable shower head or into a removable implement that attaches to the shower head so that it is applied to fabrics when the shower is turned on. Similar devices could be constructed to attach to other plumbing outlets, e.g. faucets in the bath, sink, garden.

10 When using hangers to suspend fabric during treatment, it is preferable to hang the garments to be treated with the wrinkle removal compositions using a swivel clothes hanger. The swivel clothes hanger has a frame that can be rotated around the stem of the hook. A garment hung on said swivel hanger can be oriented in many directions. This facilitates an even and thorough treatment of the garment with the wrinkle composition when using the spray to treat the garments. Additionally, the swivel hanger facilitates 15 inspection and manipulation of the garment and so is generally useful when used together with wrinkle controlling compositions.

##### **5. NON-WRINKLE CONTROL BENEFITS**

20 Some aspects of the methods of the present invention may optionally offer benefits in addition to wrinkle control including softness, silkiness, increased body (often referred to also as crispness or structure), static control, color care, color loss prevention, sheen, color maintenance, odor control, malodor reduction, antimicrobial protection, 25 antibacterial protection, insect repellence, water repellence, improve water transport, improved fabric breathability, fiber integrity, fabric integrity, fiber strengthening, fabric strengthening, maintaining the original and or natural texture of feel of the garment anti-shrinkage, shape retention, etc. Consumers need to be instructed as to the presence of these benefits and the procedures for obtaining them so that they may be appreciated by the consumer and contribute to consumer's satisfaction with the product. Therefore, it is important to instruct the consumer about the presence of optional additional benefits and to provide instruction concerning the use of the composition to achieve these added 30 benefits.

35 In addition, there are a number of benefits that may be derived from the use of a wrinkle control composition that aids the consumer in removing and controlling wrinkles in their fabrics without the application of heat to cure or otherwise activate the wrinkle controlling effect. These benefits include but are not limited to reducing the cost and care requirements for maintaining the consumer's clothing items, enabling persons less skilled or less capable to perform an effective de-wrinkling procedure on their fabrics and to

prolong the usable life of a consumer's fabrics by enabling the consumer to rewear clothing items without laundering the items.

Specifically, a nonobvious benefit of the use of a wrinkle control composition is the fact that such composition allows the consumer the freedom to purchase a wider selection of garments and fabrics, namely, garments and fabrics that are desirable but which the consumer previously avoided due to their care requirements or their tendency to wrinkle. The use of a wrinkle control composition reduces the care requirements of many garments from impractical, time consuming, and expensive to that of a simple, inexpensive practical task.

Another unobvious benefit of a wrinkle control composition is that many members of the household can use the composition successfully and without concern for the safety of the person using the composition or the clothes being treated. Consumers who cannot or who have difficulty in performing typical domestic laundering processes such as ironing, will be able to effectively use the compositions described herein. These persons include but are not limited to, children, youth, the physically or mentally challenged or handicapped, the elderly, college students and those less skilled or competent in typical laundry processes who may be of either gender, but more typically are men, especially husbands. Such consumers may use commercial laundry processes as an alternative to typical domestic laundry processes, but this is costly and time consuming and for some unavailable due to the difficulties involved in transporting fabrics, lack of funds, etc. For these consumers, a wrinkle controlling compositions provide a much more simple, accessible, and safe alternative to typical laundry processes for improving the appearance of their clothing.

As has also been described herein, a most unobvious benefit from the use of the a wrinkle control composition is the capability to extend the useful life of garments and other fabrics items that need frequent launderings, by practicing the rewear habit so as to reduce the frequency at which the item would otherwise require laundering and the fiber damage that would have accompanied that periodic laundering.

## 6. IDENTIFY POTENTIAL USERS OF THE COMPOSITION

Many fabric care products are traditionally used by only a select few members of the household. These select members will be referred to herein as the 'laundry experts'. It is often perceived that the wash process is too difficult, complex, and at times, for some household members, a safety hazard (e.g. reaching into the washing machine and/or ironing can be difficult, impossible and/or hazardous for some). It is believed that a certain degree of maturity, skill and/or willingness to put labor against the task is necessary to complete the traditional wash process which may include washing clothes,

5 drying clothes, and ironing clothes successfully (e.g. achieving the right finished look without damaging clothes). Often it develops that one person, traditionally the female-head-of-household, becomes the household 'laundry expert' and if the task is delegated to others, the safety of the fabrics, at least, will be at risk. This is because so many things can go wrong in domestic laundry processes which can be complex, comprising many steps and many items to be treated with a variety of laundry products. For instance, if the water is too hot, the fabrics will shrink. If light colored fabrics are laundered with dark colored fabrics, it is likely that colors may bleed and ruin the coloring of the lighter colored fabrics. Indeed the role of 'laundry expert' can be so onerous that it will also develop that there are households where there is no 'laundry expert' because all avoid the task either through fear of ruining fabrics or because time, energy and/or interest, are not available to perform the onerous task. In these cases, many times, money replaces energy 10 to complete the laundry processes by employing others to do this work.

15 It is advantageous to the 'laundry expert', to households with no laundry expert,  
and to consumers with limited access to laundry processes, including but not limited to  
commercial and institutional organizations, to learn that a wrinkle control composition can  
be used competently and effectively by nearly all members of the household, including,  
but not limited to children, youth, the physically challenged, the handicapped, students,  
the elderly, those with busy or physically active lifestyles. It is important to teach the  
20 consumer that a wrinkle care composition can provide a simple and easy means for all to  
use and to achieve a good finished endpoint without damaging the fabrics or creating  
safety issues for the user. It is further advantageous to those who are not 'laundry  
experts' to discover that there is a simple way for them to refresh lightly worn clothes and  
give newly washed fabrics a better finished appearance.

25 The ‘laundry expert’ is not always available to employ laundry processes that give the clothes the desired finishing touches and the simplicity and ease of the wrinkle control composition allows others to competently and safely finish their clothes for wear without having to depend on the laundry expert. Alternately, it is not necessary to pay for fabrics to be laundered that have lost a finished appearance, but are not fundamentally unclean. Instead such fabrics can be refinished and refreshed quickly, easily, safely, and inexpensively using these types of compositions. The wrinkle control composition imparts a sense of freedom and control to all members of the household to improve their appearance without undo labor or concern for safety of fabrics or individuals. Use of these types of compositions also gives the ‘laundry experts’ more freedom and control over their own time by allowing them to delegate the finishing task to other members of the household. By teaching both the ‘laundry experts’ and the ‘non-laundry experts’ this

advantage, the acceptance and use of the wrinkle care product improves the performance of the composition and increases the success of the market as measured by repurchase and share size increases also.

## 7. COMBINATIONS

5 It is preferably to teach the consumer a combination of the educational elements and most preferable to teach all educational elements disclosed herein. It is also preferable to teach other useful educational elements and tips to consumers as these become revealed in combination with nonlimiting educational elements disclosed herein.

## 10 B. DISSEMINATING INFORMATION - EDUCATIONAL ELEMENTS

15 The methods of the present invention also require providing information to the consumer concerning the use of a wrinkle control composition that provides a wrinkle controlling effect without the application of heat to cure or otherwise activate the wrinkle controlling effect. This information may be provided in the form of instructions provided in association with the product, as described above, product demonstrations, consumer 20 testimonials and other educational elements that are specifically tailored for a specific consumer group, sensory media presentations and various combinations thereof. The dissemination of the information by any of these means should be simple and easy to grasp. The dissemination of the educational elements in this manner will typically engage the consumer for at least about 5 seconds, preferably about 30 seconds, more preferably at least about 1 minute, even more preferably at least about 2 minutes.

25 A highly preferred method for disseminating educational elements is to combine a preferably live product demonstration together with a sensory presentation, namely a video presentation. The objective of using a combination of dissemination techniques is to provide the consumer with a convincing and exciting experience that will further act to heighten the consumer's awareness of and value in the use of wrinkle controlling compositions.

### 1. PRODUCT DEMONSTRATIONS

30 A highly preferred method for disseminating the educational elements, is a live face-to-face demonstration of product performance for the consumer. When consumers are exposed to such a live demonstration, they learn how improve the performance of the composition when they use it themselves. Preferably, they will also learn that the wrinkle control performance is authentic and genuine without the application of heat or the use of processes that require heat to cure or otherwise activate the wrinkle controlling effect.

35 The primary intention of product demonstrations is to overcome consumer skepticism by employing the two highly preferred educational elements to convince the

consumer that wrinkle control product performance is authentic and to instruct the consumer in successful methods of using the product to achieveve that performance. Typically, the demonstration is at least about 5 seconds, preferably it is at least about 10 seconds, more preferably it is at least about 15 seconds, more preferably it is at least about 30 seconds, even more preferably it is at least about 2 minutes, still more preferably it is at least about 5 minutes, and most preferably it is at least about 10 minutes. Since it is desirable to provide consumers with as much educational information as possible, when the demonstration format provides the opportunity, it is acceptable, for some aspects of the present invention, e.g. product parties, sales calls, multi-level marketing meetings, to provide a demostration that is about 30 minutes in length or preferably up to 60 minutes in length. Such a length will enable a demonstrator the time to demonstrate the use of a wrinkle controlling composition on various types of fabrics and to present a variety of situational uses.

It is most preferable for live demonstrations to incorporate fabrics, e.g. clothes or household fabrics (curtains, table clothes, napkins), that are relevant to the consumer and are used in their daily lives. Preferably, the wrinkle control product is demonstrated on these relevant fabrics. Because it is costly to provide real garments for each demonstration, it is anticipated that swatches, or sections or pieces of fabrics may be used to represent these relevant fabrics during the demonstration of a wrinkle control product. When swatches are used in the wrinkle control demonstration, it is highly preferred that the demonstrator have on hand a pair of the relevant fabrics that are being represented by the swatch, one of which represents the fabric article before treatment and one which represents the garment after treatment. The fabrics articles showing thewrinkle condition before and after treatment helps to set the context for the consumer and provides them with a realistic example of the finished article.

Product demonstrations can be done 'live' which for the purposes of the present invention will mean that the demonstratation is performed in the presence of the consumer. Live demonstrations have the advantage of providing the consumer with the opportunity to interact and ask questions that can clarify and remove issues and doubts that might be barriers to purchase and use. Live demonstrations also have the advantage of allowing the demonstrator to learn about the consumers' lifestyles and thereby tailor the demonstration and educational elements to the needs of the consumers.

Live product demonstrations tend to be more convincing than pre-recorded demonstrations. Many consumers are skeptical that a composition can be used to control wrinkles in a product without the application of heat to fabric treated with the composition. Consumers are more apt to accept that the wrinkle controlling effect is

authentic after they view a live demonstration of the product's performance. However, live demonstrations for every potential customer would be cost prohibitive and extremely time consuming. Therefore, many other effective means of disseminating educational elements are also presented below.

5 A preferred way to disseminate educational elements is to encourage consumers who have become convinced of the product's performance and understand how to use the method successfully, to further disseminate this information to their family, friends, and acquaintances through their own demonstrations of the product. The value of the trust factor in such personal connections can not be underestimated as it contributes to  
10 providing a convincing product performance demonstration that will increase the value of the product in the minds of other consumers.

15 Many other effective means of disseminating educational elements are disclosed below, including but not limited to, a variety of 'non' live demonstrations including virtual demonstrations, demonstrations on a variety of electronic media and demonstrations for surrogates e.g. a person that the consumer will identify with when the demonstrator give the surrogate the demonstration. Surrogate demonstrations have the advantage that these can be given to a large group of consumers at once via mass media and less garments are needed therefore, surrogate demonstrations can be extremely cost effective.

20 **a) Live Demonstrations Incorporating Direct Contact with the Consumers**

For the purposes herein a 'live' demonstration is one in which the demonstrator is demonstrating the product in the presence of the consumer.

25 Live demonstrations are a highly preferred method for disseminating educational elements as they tend to be more convincing and exciting for the consumer. A 'live' demonstration for consumers is a preferred way to present the product proposition because such a demonstration can engage the sight, hearing, touch, and smell senses of the consumer. These demonstrations are also highly interactive with the consumer able to ask questions and get focused answers and feedback on how to use product. It is a very effective way to interactively instruct consumers in successful methods of using the product and to optionally to confirm that the consumer understands the method of  
30 successful use.

35 Another surprising benefit of live demonstrations is that such demonstrations often encourage the consumers who see it to diffuse the educational elements voluntarily to family, friends, and acquaintances in a way that encourages trust and belief in product performance. Methods that incorporate the dissemination of information to family,

friends, and acquaintances are preferred, because such demonstrations ideally incorporate an element of trust that acts to increase the likelihood that the demonstration of product performance will be convincing. Such voluntary diffusion by consumers is not only effective in convincing other consumers of product performance, but it is also highly cost effective.

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Methods below that also incorporate opportunities to combine a video presentation with a live demonstration are also preferred, but not essential, as this approach is very effective in convincing the consumer of the authenticity of product performance and in instructing the consumer in successful methods of using the product.

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Various nonlimiting methods and venues for presenting the live demonstration are disclosed below.

i) Demonstrations at the Point-of-Sale

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Point-of-Sale demonstrations are demonstrations made near where wrinkle control compositions are sold. For instance, a nonlimiting list where demonstrations can be made includes airports, bus or train stations, malls, motels, hotels, on mass transportation, spas, gyms, fitness centers, restaurants, clothing retailers, or college campuses, where several retailers nearby sell the wrinkle control composition is acceptable for the purposes of the present invention. This includes virtual demonstrations when the point-of-sale is a virtual shopping destination on a computer network. Such a demonstration can occur for a single consumer or a group of consumers. The point where the composition is sold is preferably, but not limited to, the place at which the demonstration will take place. Essentially, the demonstration should instruct the consumer how to remove wrinkles on an actual garment and/or household fabric. Point-of-sale demonstration can include demonstrations carried out by retailers or sellers of wrinkle control compositions as well as by the manufacturers of wrinkle compositions. Such demonstrations can also include video presentations.

ii) Demonstrations at Product Parties

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Product parties, e.g. Tupperware™ Parties, Rubbermaid® Parties, are a cost effective and efficient way to disseminate educational elements via live demonstrations. Typically several people will attend such a product party at the home of a friend or acquaintance, therefore, several people are available for a demonstration of the composition. Not to be bound by theory, but the relaxed atmosphere of viewing the demonstration in the company of friends and acquaintances enhances the educational experience and the absorption of knowledge. The atmosphere of trust embodied in having a family member, friend, or acquaintance sponsor the demonstration also acts to increase the likelihood that the demonstration of composition performance will be

convincing. Such a relaxed atmosphere encourages the asking of questions and discussion that can enhance the consumers ability to be instructed in successful methods of using the composition. This relaxed atmosphere also encourages consumers to trade ideas about how to use the composition, as well. Small group demonstrations and discussions lend themselves well to spreading information and encouraging excitement about the said composition and article of manufacture. This methodology is also useful because the product demonstrations can be lengthy, in-depth, include video presentations and tailored to the needs of the individual consumers.

### iii) Demonstrations via Level Marketing Organizations

10 Multi-level marketing or organizations which are based on building a network of distributors, such as AmWay®, is an acceptable and useful way to disseminate information concerning the use of wrinkle control compositions. Such organizations are advantageous for disseminating information because a broad group of distributors and sales people attend product shows and become educated first hand on product performance and use. Such product shows are a useful place to provide product demonstrations and disseminate information in association with said compositions of the present invention. Once distributors and sales people are trained to demonstrate the wrinkle control compositions and are acquainted with the information to be provided in association with said composition and articles of the present invention, this group of people can train their own distributors and sales force by doing product demonstrations and disseminating information. In organizations depending on methods and devices such as level multi-level marketing and distributor networks, many of the networks are built through personal friends, neighbors and acquaintances which brings a level of trust that aids in instructing consumers on how to achieve improved performance and in convincing the consumers that product performance is authentic. This method of disseminating educational elements effectively combines the benefit of a trained group of demonstrators with trust inherent in personal relationships to provide convincing demonstrations of product performance. This methodology is also valuable because product demonstration can be lengthy, in-depth, include video presentations, and tailored to the needs of the individual consumers.

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iv) Door-to-Door Sales

Door-to-Door sales as done by corporations like Avon Inc. are a good way to provide information directly to the consumer. During the sales call, the sales representative has a unique opportunity to discuss the composition and how to improve the performance of wrinkle control compositions, and to incorporate the use of such compositions into their daily routine. During the time afforded by the sales call, the sales

representative will have an opportunity to provide preferred combinations of presentations e.g. live demos combined with video presentations and other types of presentations. Door-to-door sales can be highly effective in instructing the consumer in successful methods of using the composition and also in tailoring educational elements to the consumers' daily habits and lifestyle needs since the consumer and the sales representative have time together to discuss the consumer's lifestyle. The consumer will have opportunities to ask questions to help with their understanding of the performance of the said composition as well as methods of use. Also, advantageously, the consumer can present real-life examples for on-the-spot, relevant demonstrations which should prove even more convincing than demonstrations on fabrics the sales representative might choose. While door-to-door sales is typically not an efficient method of broadly disseminating information, it is a highly effective method of communication due to the opportunity to spend an effective amount of time with the consumer.

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v) Demonstrations at Special Events

Special events (e.g. concerts, festival, fairs, fashion shows, product shows, political events, sports events, graduations, book tours, poetry readings, art shows, movie, theater and restaurant openings) are acceptable venues for dissemination of information to the consumer. Such special events have the advantage of providing the flexibility to reach a large group of people while simultaneously interacting with smaller or one-on-one selections of consumers from the larger group. Special events also provide opportunities for promotional activities and demonstrations to surrogates as described below.

vi) Demonstrations for Club Groups and Associations

National and regional club groups and associations e.g. groups that bring persons together who serve special interests or hobbies are acceptable venues for disseminating information. Presentations at club groups meet the need of giving effective demonstrations to small and large groups of people and can also provide a venue for consumers to ask specific questions to help the presentation and demonstration to their specific habits and lifestyles.

Some nonlimiting examples of club groups include groups based on shared work interests e.g. Association of American Business Clubs (ABUCS), American, American Medical Association, National Federation of Young Farmer; political groups e.g. College Democrats of America, The College Republicans; student groups, e.g. fraternities, sororities; clubs based on ethnic, gender, or demographic similarities, e.g. Egyptian Student Association, National Association for the Advancement of Colored People (NAACP), American Association of Retired People (AARP), National Organization of

Women (NOW), Ireland-Japan Friendly Club; and hobby groups e.g. National University of Singapore Taekwondo, United States Chess Federation, American Bonsai Society, United Kingdom Radio Society, Foreign Correspondents Club of Japan, Russian Motorcycle and Sidecar Owners Association of Australia, and Moscow City Golf Club.

5                   vii) Encouraging Friend-to-Friend Demonstrations of Product Performance and Dissemination of Educational Elements

10                  Encouraging friends to disseminate information to the consumer concerning wrinkle control compositions via convincing live demonstrations instructions in successful use of the product as well as other optional educational elements and/or via various other methods of presentation are effective, efficient, and affordable. Encouraging friends to do live demonstrations for friends and neighbors and disseminate information is also especially effective because there is an element of trust in the relationship that contributes to effective communication of the benefits and educational elements. The act of encouraging friends to demonstrate to friends and neighbors can be accomplished in a variety of ways including, but not limited to offering tangible rewards (e.g. monetary remuneration, promotional offers, gifts, products, or coupons) as well as non-tangible rewards (e.g. providing recognition or opportunities to increase prestige) . People who are known to *embrace* new product offerings and desire to disseminate this information to their friends (a group often known as 'early adopters') can be given convincing live demonstrations and instructed in successful methods of use which essentially accomplishes the dual tasks of raising product value in the mind of the that particular consumer and also teaching that particular consumer how to appropriately disseminated information concerning wrinkle control compositions to others.

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25                  Consumers who will demonstrate for others can also be given presentations of educational elements on various media (e.g. video tape, compact disk) and also coached on benefits of the compositions in addition to wrinkle control (e.g. fresh odor, rewear opportunities) to ensure that they give effective demonstrations and presentations. These presentational and demonstrations preferably comprise convincing other consumers of product performance, instructing other consumers in successful methods of use, as well as other educational elements and combinations of educational elements and in providing presentations that preferably appeal to the multiple senses and combine various presentation approaches. For some consumers the prestige associated with being the first to use a product and be the knowledgeable person who teaches friends about the product is enough incentive to encourage them to teach friends about the product. Such a segment of consumers is often called 'the early adopters'. To facilitate the process by which 'early adopters' will teach friends and neighbors to use the product and to fuel the

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incentive of 'early adopters' to do so, it is useful to identify a group of people fitting the 'early adopter' profile and to provide them with product samples and educational materials, before these become widely available so that they perceive themselves to have unique and exclusive knowledge that they will be anxious to share with their friends and  
5 neighbors.

**b) Demonstrations for Surrogates**

For the purposes of this invention, a surrogate will take the place of the consumer and will be an individual that the consumer identifies with. There will be many instances in which the demonstration of the wrinkle control composition will be given to the  
10 surrogate in the place of the consumer. Preferably the surrogate will demonstrate a sense of excitement, amazement, and desire for the composition as well as other positive emotions linked with the product. The surrogate could either be or represent a real consumer or the surrogate can be well-known celebrity or a person that is trusted by a wide group of consumers. Optionally, surrogates can be chosen to capture the interest of  
15 specific segments of the consumer population, particularly the non-traditional segments and this optional approach has the advantage of fitting in well with a program aimed at tailoring the dissemination of information to the consumer or a specific group of consumers. Some typical but nonlimiting surrogates demonstrations might include a presentation on a talk show to a host, such as Jay Leno or Oprah Winfrey or a  
20 presentation at a show or concert to a popular performer or performance group such as N-Sync. Another approach to surrogate demonstrations is to have a famous personality trained to provide demonstrations either for other famous personages or for consumers and/or surrogate consumers or representations of consumers.

i) Personality and Talk Shows

Personality and talk shows typically incorporate one or multiple host(s) and/or hostess(es) that interview people. These typically reach large audiences and are an efficient route to disseminating information broadly in a cost effective manner. Talk show hosts and/or hostesses often become well-known and respected celebrities in their own right and therefore, become highly preferred choices to provide a surrogate experience for the consumer in the viewing audience. Persons that the host and/or hostess are interviewing can often make suitable surrogates as well and are often suitable for including in the surrogate demonstration experience for the audience. Some nonlimiting examples of currently relevant, highly recognizable, and respected host(s) and or hostess(es) include , Oprah Winfrey, of the *Oprah Winfrey Show*, Jay Leno of the *Tonight Show*, Martha Stewart on *Martha Stewart Living* Emeril Lagasse of *Emeril* and *Emeril Live*, Mary Hart, Bob Boen, etc. of *Entertainment Tonight*. While the visual  
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experience is preferably, audio experiences, e.g. radio, compact disk, etc. are also acceptable for the present invention as a method of disseminating information effectively and efficiently.

ii) Performance-Based Shows

5 Suitable surrogates, in the form of current, relevant, well-known, and respected celebrities are often part of a special events. Some nonlimiting examples of special events include concerts, book tours, poetry readings, sports events, fashion shows, etc. Such events provide useful forums for surrogate demonstrations that are efficient and cost effective way since these forums reach a multitude of consumers simultaneously. Such 10 events can be live, in the sense that consumers are present at the events in person and/or the events can broadcast via a multitude of mass media and/or prerecorded via a variety of recording media - records, tapes, radio, compact disks, video tapes, movies.

15 iii) Advice and Self-Improvement Presentations

Advice-Based presentations include presentations giving the consumer lifestyle 20 advice, advice on how to improve their quality of life, etc. Some currently relevant, non-limiting examples of such presentations would include Martha Stewart's *Martha Stewart Living*, *Fashion Emergency*, *Homes with Style*, and *Shabby Chic* all on E!, Richard Simmons exercise videos, *Body Shaping*, *Fitness Beach*, and *CoEd Training* all on FitTV the Fitness Network, *Alive!* with Joyce Resin, *Power House* presented by Alliant Energy, and *BBC Home and Garden*. Such presentations can be provided via a variety of media, presentations before live audiences, and virtual websites being the most typical but nonlimiting.

25 iv) Game Shows

Game shows are also an acceptable venue for giving demonstrations and disseminating information to consumers via surrogates. Game show hosts are often well 30 known and trusted by consumers. Additionally, game shows have the advantage of providing an opportunity for raising the wrinkle control composition awareness by showcasing new and innovative products both by sponsoring the program as well as offering wrinkle control compositions as game show prizes. *The Price is Right*, *Wheel of Fortune*, *Who Wants to be a Millionaire*, *Win Ben Stein's Money*, *Rock and Roll Jeopardy* on MTV, *Cooking for Love* with Thea Andrews on WTN, Toronto Canada, *Ready Set Cook!* with Sissy Biggers on the Food Network, *Hollywood Squares*, *Double Dare 2000* on Nickelodeon Network, are all nonlimiting examples of currently relevant game shows.

35 c) **Combinations of Demonstrations**

Combinations of demonstrations are most effective for rapidly diffusing the information to the broadest group of consumers and also targeting specific segments of

consumers. A highly preferred combination includes a live demonstration together with a video presentation that is at least about 30 seconds long, but preferably greater than 30 seconds long and comprising information to convince the consumer of authentic product performance and/or instructing the consumer in successful methods of using the product.

5 Combining demonstrations also achieves the purposes of increasing consumer awareness of the wrinkle care products in many segments including the non-traditional segments and also reinforces the educational knowledge in the consumers' minds.

## **2. CONSUMER TESTIMONIALS AND TAILORING EDUCATIONAL ELEMENTS TO SPECIFIC CONSUMER GROUPS**

10 Consumers, especially non-traditional consumers, place higher value on products that are endorsed by other consumers, even when these consumers are strangers to them. Any consumer is seen as an advocate for all consumers and therefore can surprisingly increase the value of a product by offering their endorsement or testimonial. This is especially impactful for non-traditional consumer of fabric care products, because these

15 consumers surprisingly have difficulty imagining themselves successfully using a fabric care product. When a role model with a similar background and lifestyle is presented endorsing the product and preferably also disseminating information concerning the authenticity of product performance or instructions for using the product successfully, the consumers are much more likely to value the product.

20 For some aspects of the present invention, it is preferable to tailor the dissemination of information so that it is directed to certain segments of the population. Tailoring dissemination of information surprisingly helps consumers to understand and accept how a product fits into their daily habits and lifestyle and thus increases purchase and repurchase rates. Some nonlimiting examples of tailoring educational elements include, for instance, apartment dwellers and consumers who live in small domiciles benefit from education teaching them how to use the product when only small areas of space are available for line drying, hanging, spreading, and storing clothes. Consumers who embrace ironing appreciate education on how to use this product in combination with the iron to remove wrinkles better than steam irons and also leave fabrics soft to the touch (in contrast to starch); consumers who are physically challenged (e.g. people with visual impairments benefit most from specific audio presentations; college students, busy adults, and younger people and young adults who don't normally have time or find the time to place clothes in an arrangement that prevents wrinkling or don't have easy access to the equipment for the traditional laundry process benefit from educational elements teaching them to use the product on clothes that are wrinkled from improper storage e.g. storing clothes in piles; fabrics kept in the dryer too long after the drying cycle has

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finished; fabrics stored in compressed conditions, comprising trunks, suitcases, clothing valets, drawers, tight closets, tight armoires, stored without folding or hanging, fabrics left in a laundry basket; fabrics laundered with spin cycle set at high, fabrics washed in very hot water or dried under very hot conditions and combinations thereof.

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### 3. SENSORY MEDIA PRESENTATIONS

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Sensory media presentations include all types of presentations and advertisements that can be experienced through the five senses including sight, sound, touch, smell, and taste or through virtual stimulation of these senses. Surprisingly, the most appealing demonstrations of the wrinkle control product for consumers are those that interact with and/or engage as many of the senses as possible. Presentations including sight, sound, touch, and smell are preferred for the present invention, but taste is not specifically excluded as a potentially useful sense to engage. In addition, sensory media presentations may also provide direct interaction between a demonstrator or presenter and consumers. Likewise, sensory media presentations can be recorded and broadcast repeatedly and as widely as desired. The sensory presentations used in the methods of the present invention will preferably be greater than about 30 sec., more preferably greater than about 60 sec. even more preferably greater than about 90 sec. and most preferably greater than about 120 sec. in length.

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Sensory media presentations provide an extremely efficient and affordable way to disseminate educational elements to the consumer. Sensory media presentations can also be tailored to specific consumer groups so that they have greater impact on the consumer. When sensory media presentations are used, the presentation is typically at least about 30 seconds, preferably at least about 45 seconds, more preferably at least about 60 seconds, even more preferably at least about 90 seconds and most preferably 120 seconds. On the other hand, sensory media presentations can often be quite costly, especially when broadcast widely, and time often becomes an economic issue, such that it sometimes necessary and acceptable, for some aspects of the present invention, to provide a sensory media presentation that is typically less than about 30 seconds, but preferably greater than about 5 seconds, more preferably greater than about 10 seconds and most preferably greater than about 15 seconds.

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Video presentations, especially in combination with live demonstrations, provide a highly convincing and exciting experience for the consumer that dramatically increases the value of wrinkle controlling compositions and significantly increases their intent to purchase. There are, however, cost, time, and efficiency barriers that prevent providing a live demonstration and video presentations longer than about 30 seconds to every consumer interested in using the composition. Therefore, alternate methods for

disseminating educational elements that are effective, affordable, and time efficient are also disclosed as part of the methods of the present invention. These can include shorter video presentations of equal to or less than about 30 secs, preferably less than about 15 seconds, more preferably less than about 10 seconds and most preferably less than about 5 seconds when cost effectiveness of the video presentation is an issue.

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**a) Electronic Media**

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Electronic media covers a plurality of means to communicate including all communication tools that operate via electronic means and/or electromagnetic radiation. Electronic media is a very efficient tool for disseminating educational elements to a broad number of consumers. Electronic media is also extremely useful for reaching non-traditional consumers to heighten their awareness of the product.

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i) Television

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Television is a preferred electronic medium for disseminating educational elements due the fact that television reaches a large number of consumers through a wide variety of programming, thus reaching many different consumer segments. Also, since television is a well-established medium, the consumer segments being reached by different programming are often well understood making television an ideal medium for targeting specific and often, non-traditional consumer segments. Television can also encompass a variety of programming formats including, but not limited to, entertainment in the form of comedies, drama, also info-mercials, commercials, talk shows, informational shows, sports, and all manner of special interest programming (e.g. home care, cooking, fashion, history, travel). Use of the product as part of programming not necessarily sponsored or funded by the product manufacturer (e.g. within the 'script' of a entertain program or presented as part of a talk show) as well as in commercial advertisements are acceptable methods of disseminating information to the consumer. Again it is most preferred to disseminate information directed at convincing the consumer of authentic product performance or instructing the consumer of successful methods for using the product. When television is used, it is preferred that audio as well as visual content is presented, but in some aspects of the invention it is acceptable to present visual or audio elements alone. Infor-mercials are an especially preferred format for disseminating educational elements associated with the composition and articles of the present invention, because info-mercials are typically greater in length than about 30 seconds and these are efficient at reaching a wide variety of consumers and also these formats typically include product education.

ii) Computer Links

5 Providing computer links via computer-based networks, a nonlimiting example of which is the global computer network, to sites (e.g. web pages, web pages) is an efficient, effective, and cost affordable method for disseminating information to the consumer. A benefit of using computer links is the extreme breadth of reaching consumers and the extreme versatility for disseminating information, including, but not limited to, the ability to give the consumers access to the information from anywhere a computer link is available. Consumers are presently able to access such networks from their homes or via satellite networking from portable devices. Another benefit of using computer links is 10 the opportunity to provide multimedia presentations that allow the consumer to interact effectively and the ability to update and change the information constantly in order to keep it current, relevant, and meaningful as products and consumer needs change. Finally, the ability to probe the consumer database as the consumer interacts with a presentation or demonstration such that these elements can be further refined and focused 15 for specific consumer segments, to capture the attention of specific segments through advertising on web sites and links of interest to those consumer segments.

20 It is preferred to engage as many senses as possible when disseminating information via the computer link by incorporating audio-visual elements and animated presentations. Ideally, a virtual experience is provided that is as near to reality as possible. In this way, the computer can be used to provide a demonstration that is as near to a 'live' demonstration as a consumer could get without being in the presence of a 25 presenter. This virtual demonstration can effectively disseminate information to convince the consumer of the authentic product performance and instructing the consumer in successful methods of using the product. It is preferred that the presentation be interactive to allow consumer to interactively learn how to the information to be presented to their own daily habits and lifestyles. Typically, frequently asked questions 30 (FAQS) and answers to can be available on the link. It is preferred that presentations of product effectiveness on computer links be at least animated and for these animations to be as realistic as possible so as to offer this as a surrogate demonstration including demonstrations to both celebrities and typical consumers or even have demonstrations by consumers.

35 It is suitable and preferable to use the site to provide consumer testimonials particularly when these testimonial contain information concerning product uses to other consumers. It is preferably for consumer testimonials to be at least animated, and even more preferably, for these testimonials to be video taped. It is preferred that links and addresses directing consumers to links with educational information be widely available

to the public and published everywhere advertising for the product occurs e.g. on television, at point-of-sale, on product, on product labeling, on billboards, etc. Websites for other purposes can also contain a link to the website for the product of the present invention such as the nonlimiting example of banner advertising which will contain a link to direct the consumer to the product site.

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iii) Video Presentations

Video presentations include all presentations that can be stored on devices that capture video images and can re-play the presentation when desired, including the nonlimiting examples of compact disks, film, overhead projectors, and video tapes. 10 When an video presentation is used to disseminate information, this presentation contains audio as well as visual content. Video presentations with visual content only, are acceptable for some aspects of the present invention. Video presentations can be provided in a number of ways, including a video presentation together with the product and packaging to disseminate information in a visual format when a consumer purchases 15 a wrinkle control composition. Providing video presentations with product is an effective way to target consumers who intend to use the product. The video presentation is typically at least about 30 seconds, preferably at least about 45 seconds, more preferably at least about 60 seconds, even more preferably at least about 90 seconds, and most preferably at least about 120 seconds in length. Because, sensory media presentations 20 can often be quit costly, especially when broadcast widely, it is preferred to provide a sensory media presentation that is typically less than about 30 seconds, but preferably greater than about 5 seconds, more preferably greater than about 10 seconds and most preferably greater than about 15 seconds.

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Video Presentations with Information Appended to Video Presentations for Other Purposes

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Video presentations for other purposes are produced for a variety of reasons. A few examples include the recording of entertainment, e.g. movies, special events, exercise, video games, all manner of advice, and educational material, which are then sold or rented to the public. Such video presentations, provide an excellent and cost effective way to disseminate information concerning wrinkle control compositions to a broad number of consumers and also reaching many who may not yet have tried a wrinkle control composition such as disclosed herein. The video presentation of usage information may be appended onto the main portion of the video presentation in much the same way as a commercial is appended into televised programming. Preferably, there will be an incentive to encourage the consumers who rent or buy the video presentations for other purposes to view the video presentation of the educational elements appended

onto the video presentation and additionally, it would be preferable, although not essential, if these was an incentive for the consumer to show the video presentation of educational elements to family, friends, neighbors, and acquaintances.

Video Presentations as Part of a Store display

5                   Video presentations as part of the store display are an efficient, effective and affordable way to disseminate product usage information. Such a presentation can be long, incorporate a variety of product information and a plurality of uses. Advantageously, it can be left running constantly by as part of a display. Such a video presentation also accomplishes the purpose of increasing the 'facing' shelf space or shelf presence of the present invention, thus accomplishing the purpose of increasing the awareness of the composition in the consumers' mind. Furthermore, such presentations are effective at targeting consumers with an interest in the product.

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Interactive Video Presentations

15                   Interactive video presentations are a highly preferred way to provide a video presentation. In the present invention, an interactive video presentation is one in which the consumer can interact with the presentation to accomplish a number of purposes. Typically, these purposes include giving the consumer some control over the presentation and allowing the consumer to disclose information to tailor the presentation or provide advice. A typical nonlimiting example of an interactive video presentation is the video touch screen. One typical, but non-limiting element of control that the consumer has with video touch screens is control over the flow of information. The consumer can choose which categories to view and when to view these categories. Interactive videos provide a means for the consumer to tailor the presentation to give them focused information that will allow them to best incorporate the product into their daily habits and lifestyles.

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25                   iv)      Audio Presentations

30                   Audio presentations are also useful for disseminating information and can be affordable and very efficient. Audio presentations are very affordable and very efficient. Additionally, audio presentations are useful for providing reinforcing reminders of the product availability and information to direct consumers to places of purchase. Audio presentations can be offered in the form of radio or appended onto compact disks as well as audio tapes and recordings. Audio presentations are also useful for inclusion in a container or packaging with a wrinkle control composition to disseminate information at time of purchase. Including an audio presentation in a container with the wrinkle control product also accomplishes the purpose of increasing shelf space and presence of the composition which increases the consumers' awareness of the product.

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### b) Printed Media

Print media include all media that are provided in written form preferably together with a variety of audio-visual material and presentations, but printed media alone is also useful for disseminating information in the methods of the present invention. Print media can be provided by traditional routes e.g., via hardcopy formats, e.g. paper or other tangible substrates via electronic medium and/or virtual routes, e.g. via television, computers, internet, and/or websites. Preferably pictorial materials are included which will aid in communicating information expressed in words and graphics such as icons. Print media are relatively inexpensive and provide the further benefit that they can be tailored to focus information to meet the daily habits and lifestyles of specific consumer segments as well as targeting specific consumer segments. Preferably, the print materials will be accompanied by visual and/or pictorial materials that help to explain product performance and/or instructions for use such as the nonlimiting example of icons. Print materials can also comprise short 'catch phrases' that identify the product.

i) Periodicals

Print materials in hardcopy or electronic periodicals (e.g. newspapers, newsletters, magazines, journals,) whether in the form of advertisements, articles or any other materials that communicate information are suitable for disseminating information in the methods of the present invention. A useful format is one that provides the longer than traditional advertisements which have the appearance of an article and are aimed at educating consumers. Preferably, pictorial content is included to aid in communicating the ideas and concepts presented in words. A feature of periodicals that is highly useful for the present invention is that periodicals are often targeted to communicate to specific segments of the population and the segment audience is well understood. Thus, periodicals provide a favorable format for targeting consumers, especially non-traditional consumers with educational elements tailored to fit into their specific daily habits and lifestyles. Some non-limiting examples of harcopy and electronic periodicals are *Vogue*, *In-Style*, *Glamour*, *Teen*, *People*, *Home & Garden*, *Architectural Digest*, *Smithsonian*, *Scientific American*, *GQ*.

ii) Brochures

35 Brochures containing educational elements are also a useful form of print media for use in the present invention. Brochures can be distributed widely to disseminate the information and are also relatively inexpensive. Brochures have the further advantage of flexibility, as these can suitably disseminate information in virtually any environment that a consumer may frequent, including at point-of-sale, clothing stores, group meetings, door-to-door sales, special events, restaurants, hotels and other places of lodging,

bookstores, coffee houses, laundromats, drycleaning establishments, as well as being distributed to the consumers' homes, etc. Brochures can also be attached to wrinkle control product or included in containers comprising wrinkle control product.

iii) Billboard Presentations

5 Billboards provide an acceptable method for disseminating information to the consumer. Billboards serve the purpose of reaching a wide variety of consumers efficiently, effectively, and affordably. Preferably these contain printed, pictorial, and visual information communicating educational elements. Preferably these will quickly command the attention of consumers and allow them to rapidly assimilate all or a portion  
10 of the educational elements. Icons are a nonlimiting example of visual elements that can convey information quickly.

iv) Store Displays

15 Store displays often provide useful formats for disseminating educational elements in printed form. Preferably, these displays would also be visually interesting by incorporating both pictorial, video, and design elements (e.g. architecture, color, etc. of the display) to heighten the consumers' awareness. As part of a store display, product information can be printed on the store shelf, on signage in and around the wrinkle control compositions on aisle flags, on floor markers (e.g. mats), and stand alone displays containing product. Store displays such as signage and floor markers that direct the  
20 consumer to wrinkle control products are preferred as these also accomplish the purpose of heightening the consumers' awareness of wrinkle control products.

v) Information Printed on the Package, the Package Container  
or in Contact with the Package

25 Package labels, containers or items in contact with the package, e.g. a nonlimiting example being a neck-hanger type brochure or a brochure attached to the package, are all suitable places for the dissemination of educational information. Typically this information will be available in both printed and some other type of visual and/or pictorial style, e.g. a nonlimiting example of visual/pictorial style would be icons. Disseminating educational information on package labels, containers and/or in contact  
30 with the package all have the advantage of being efficient, effective, and affordable.

**4. COMBINATIONS METHODS TO DISSEMINATE EDUCATIONAL ELEMENTS**

35 Combinations of various demonstrations and presentations are preferred as being highly effective approaches to providing information concerning the use of wrinkle control compositions to the consumer. Particularly preferred are combinations of demonstrations of the compositions, preferably live together with video presentations.

These types of combinations achieve the effect of reaching as many consumers as possible since different consumers and different segments have access and respond to different types of presentations, demonstrations and stimuli. Using combinations of demonstrations and presentations also achieves the purpose of reaching some consumers with product information more than one time. Different presentations and demonstrations act to reinforce the teaching of product usage information to the consumer and thus result in increased understanding of the wrinkle control compositions and their capabilities and in increased use and purchase of the wrinkle control products.

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### **C. METHODS FOR IMPROVING PRODUCT AWARENESS**

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Wrinkle control compositions have an apparent low value in the consumer's mind despite the fact that these compositions can provide good wrinkle control performance without the application of heat. Further, these compositions have typically been marketed as niche compositions with specific uses, particularly for travel and within the context of current laundry processes. Therefore, these products have been targeted to a narrow group of consumers despite the fact that wrinkle control compositions have a plethora of uses that serve everyday needs beyond travel and that fall *outside* of and/or are *complementary* of current laundry processes. It is also clear that the consumer has failed to realize the fact that the composition is surprisingly easy for consumers of all ages, lifestyles and abilities to use competently and safely.

Another key surprising element is recognizing that this product can be safely and successfully used by a variety of consumers that fall outside of the consumer typically targeted for fabric care products, namely, the female head of household. Marketing to the non-traditional consumer as well as the traditional consumer dramatically increases the breath of reach of the marketing program and consequently, the size of the business. It is still more surprising to recognize that this product can be safely used by consumers who might never or no longer be able to iron safely or easily, such as the elderly, the physically challenged, and children. Targeting such groups as well as seeking their support and endorsements opens unique and surprising new markets to grow the business. Non-traditional fabric care consumers surprisingly embrace the wrinkle control product since it frees them from dependence on the wash process and/or waiting for the person who traditionally carries out the task. Traditional fabric care consumers as well as persons who normally do the wash also embrace these wrinkle control compositions since they allow others to successfully carry some of the load of caring for fabrics without worry that clothes will be damaged or injury or property damage will result as is the risk with ironing.

Methods that increase consumer awareness comprise at least one element selected from the following list: 1) increasing awareness at point-of-sale, 2) increasing awareness electronically, 3) targeting non-traditional consumer markets, 4) targeting non-traditional distribution channels, 5) rewards programs, 6) appropriate pricing strategies, and 7) combinations of methods thereof.

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### **1) Increasing Awareness at Point-of-Sale**

Although currently marketed wrinkle control products are high performing, these products have surprisingly low sales. Increasing consumer awareness of the products dramatically increases the value of the product in the consumer's mind. Methods for increasing awareness at point-of-sale should comprise at least one of the elements selected from the following list: 1) increasing product choices and shelf presence, 2) store displays, 3) live drama, 4) seasonal promotions, and combinations. Although all methods for increasing awareness are preferred, the most highly preferred method for increasing awareness is to increase product choices and shelf presence.

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#### **a) Increasing Product Choices and Shelf Presence**

Since, it is helpful to market the product to a variety of consumers rather than focus marketing on the traditional female-head-of-household, it is also helpful to provide variants of the product to appeal to consumers with differing needs. Extending product choices, makes it possible to increase space presence and overall size of the product on shelf and thus increase the awareness of the product in the consumers mind. Offering variants also increases the overall value of the category in the consumers mind, thus increasing the likelihood of repurchase and increasing the overall profit of the category.

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##### **i) Product Choices**

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Since wrinkle control products have multiple uses and appeal to a multitude of consumers, it is necessary to increase the number of product choices is to increase the size of the business. Preferably, more than one variant of the product is available on shelf. Some examples of variant strategies are presented below. Surprising, scent contributes significantly to the acceptance of a product and to the consumer's subliminal understanding of the product function, therefore getting the perfume correct for the consumer base and matching the consumer's subliminal understanding of product function with the right perfume is critical to success.

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Additionally, the product appeals to a much broader range of consumers than the traditional consumer for laundry and fabric care products, and thus, it is necessary to

have more than one fragrance to communicate the product function to the broader range of consumers.

Also, it is found that in consumer use the product has more than one function and even more surprising is the fact that wrinkle control products are found to have uses that either fall outside of and/or complement typical domestic laundry processes and dry cleaning processes. For instance, in addition to removing wrinkles, it can be used to refresh garments for re-wear e.g. the product can remove wrinkles and odors from already worn garments. In other words, lightly worn garments can be reworn without going through the entire time consuming wash process. While typically the consumer will prefer a lighter scent to match their subliminal understanding of the functionality of the product a slightly higher scent impact is helpful in eliminating odors from previous wear e.g. smoke, food, and body odors. Also, a higher scent is useful in matching the consumer's subliminal understanding of the functionality of a re-wear product.

Consumers also surprisingly prefer different hand feels on different fabrics. For instance, when sweaters, knits, dresses and silks are treated with wrinkle spray, it is preferred that the hand feel be generally towards softness, silkiness, or similar descriptors and that the fabric maintain its flow and soft drape; the wrinkle control product should not only remove wrinkles, but also maintain and enhance the softness, silkiness, and drape of such materials. When fabrics are tightly woven cottons, dress shirts, khaki pants, heavy cotton shirts, or various formal dress items, it is desirable to have more body in the fabrics and thus the wrinkle control product should not only remove wrinkles, but also impart and improve the body of the fabrics without making these fabric scratchy.

Other line extensions might include products specific to delicates, dry cleanables, cottons, synthetics, or winter clothes and summer clothes.

Products with packaging variants are useful as well. For instance, to provide the most user friendly product possible to the physically challenged, packaging requiring little effort to actuate the spray may be offered.

Again in order to appeal to a larger array of consumers with different needs, it is necessary to offer a variety of sizes as well as refill packages and club sizes. Additionally, this can be used to appeal to persons of different economic backgrounds.

When a number of different product types are offered, bundling can be used to connect more than one package together to increase overall size and awareness on shelf. For the purposes of the present invention at least one of the bundled products must be a wrinkle control product. The additional product or products can comprise additional wrinkle control composition or non-wrinkle control product, including the following,

nonlimiting, examples, odor control spray, laundry detergent, fabric softener, extra packaging, a refill of wrinkle spray, or additional, packaging elements, e.g. sprayers, bottle caps. Product bundling acts to increase the 'facing' or shelf space and also shelf presence of the present invention by increasing the amount of space the composition can command on the shelf.

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iv) Container Enclosing Wrinkle Spray Product and Package.

For the present invention, the container is any enclosure that covers or partially covers the wrinkle spray product and package. Containers can be made from many materials including, but not limited to, plastic and cardboard. Containers serve many purposes, some nonlimiting examples include: a way to comarket or give away devices, implements, and/or additional items, including educational elements as described herein above, with the wrinkle control product that make the wrinkle spray product easier, more convenient, or more acceptable for use by the consumer. Such containers tend to increase 'facing' or shelf space at the point of sale to increase consumer awareness of the product.

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Educational Information

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Educational information can be used both to communicate the product information discussed above and also to increase the size of the entire container to be sold. Information included with the container can be provided in a variety of ways including, but not limited to, visual and/or audio compact disks, visual and/or audio tapes, printed media that surround or partially surround the wrinkle spray package.

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**b) Store Displays**

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Store displays both increase the shelf presence of the product on and critically move beyond the shelf to capture the consumers' awareness and direct it to the wrinkle control products. Preferably, store displays are interactive, interesting and compelling to the consumers' senses to keep the consumers' attention on the product for a longer period thereby increasing the likelihood that consumer awareness of the product will increase. Displays preferably comprise sensory media presentations that engage as many of the consumers' senses as possible. Interactive displays are also preferable as such displays can allow the consumer to tailor the dissemination of information to their own daily life, habits and preferences, thus increasing the likelihood that the consumer will appreciate the efficacy and relevancy of the product. Non-interactive displays are also suitable for the present invention. Some nonlimiting examples of store displays that surprisingly increase consumer awareness and direct it to products are disclosed herein below for use in the present invention.

### i) Architectural Elements

5 Architectural elements can surround the product and draw consumer attention to the product by virtue of providing a visual discontinuity in the store shelving. Preferably, these are unique enough to cause a consumer to look and/or remember the presence of the product and even more preferably to draw the consumer to the product and most preferably to stimulate a purchase. Architectural elements can comprise a multitude of graphical, printed, and pictorial information.

## ii) Visual Media

10 Visual media including print and pictorial information on the shelf, around the product or somewhere in the store which preferably identifies, the product, leads the consumer to the product and disseminates product information as well as any other educational information useful to the consumer. These can be encompassed in signage such as posters, advertisement boards, aisle flags, floor mats, etc. Visual media can also be encompassed in videos run on constant loop to disseminate educational elements and/or videos that are interactive with the consumer as well as computers that provide links to relevant information. Visual media can also include brochures that the consumer may take home. Preferably, print used in this displays will be large enough to be easily read. If print is present on shelves, poster boards or aisle flags, it is preferable for it to be large enough to be easily read some distance away and also while the consumer is moving.

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### iii) Kiosks and Vending Machines

25 Kiosks and vending machines are small stand alone units that are independent of stores with larger area space. Such units are typically ideal for targeting particular consumers. The fact that these can be automated makes them ideal for non-traditional distribution sites for fabric care product as well, such as airports, college campuses, bars, restaurants, physical fitness facilities, public restrooms, walkways in malls, strip malls, parks, public and private facilities, recreational centers, community centers, etc. Kiosks and vending machines would preferably have provisions for disseminating educational information.

### 30 c) Live Drama

In live drama, product awareness is created when a group of actors perform a skit at point-of-sale. Skits also serve to surprise and entertain the consumer and therefore create higher awareness of the product. Preferably, skits are performed at times of peak traffic through the point-of-sale.

**d) Seasonal Promotions**

Seasonal promotions are a useful way to create awareness because these tie the need for the product together with an event in the consumers life. For instance, back-to-school promotions are useful for alerting parents to the opportunities to use product for children's school clothes and uniforms and also the opportunity to provide the product to students returning to college. Back-to-school promotions can also capture the attention of adolescent and college-age consumers who are image conscious, but pressed for time and/or not adept at domestic processes.

**2) Increasing Awareness Electronically**

**a) Marketing via Computer Networks**

Computer networks and particularly global computer networks are an inexpensive means of increasing product awareness electronically. Additionally, studies have shown that the internet and global computer networks can reach audiences that have a lower than normal interest in traditional electronic media, such as television. A report by *Nielsen Media Research* entitled *TV Viewing in Internet Households* compiled in May 1999 from data sources such as National People Meter data and Nielsen/Net Ratings shows that homes with access to internet contain lighter TV viewers. Therefore, surprisingly, computer network marketing can be reaching consumers not necessarily engaged by television advertising. Computer network marketing can take on various forms as disclosed below. Computer network marketing is an ideal way to reach consumers in a dynamic fashion, because it can be easily rearranged and lends itself well to seasonal promotions.

**i) Homepage/Website for Product**

The homepage/website for the product is a place consumers can visit to learn more about wrinkle control composition and their use. This interaction can take many forms including education, tailored information and advice through virtual interaction with the consumer, virtual demonstrations, instructions for use, chat rooms for consumers to trade usage tips, and a location to acquire samples, and buy product. Preferably, the home page would comprise 1) a convincing demonstration of product performance and 2) instruct the consumer as to successful methods for using the product. In addition, the website can provide consumers with information on where to buy product, other sources of product information such as consumer helpline numbers, and offer opportunities for consumer to join clubs that provide incentives and to suggest effective new ways to use the product.

ii) Advertising on the internet away from homesite

Advertising on Internet away from the homesite can be accomplished via banner advertising. Banner advertisements are those that are run on the internet at other websites. Preferably, the banner advertisement attracts attention and is engaging and amusing. Also, preferably, the consumer can reach the home website by selecting the banner advertisement in some way for instance by clicking the banner advertisement. Comarketing wrinkle control compositions with other products on the internet is also possible. Preferably, the comarketing program will provide the consumer with ways to interact with the said composition and/or articles of use as disclosed above in section 2a)I and/or provide a hot link to the homesite of the said composition and/or articles of use.

iii) Viral Diffusion

When using internet marketing it is surprisingly effective to disseminate the homepage website address for the said composition on labels, literature, billboards, point-of-sale displays, and advertising in other forms of electronic media, e.g. radio and television. Additionally, information about products may be distributed via viral diffusion on the internet. Viral diffusion is effectively a modern, highly efficient, electronic version of word-of-mouth advertising. Preferably, viral diffusion involves giving an incentive to consumers to encourage them to recruit other consumers to increase product awareness by passing along information to others. Some nonlimiting examples of information include a website link, a hotlink a banner advertisement, a product demonstration, product information, etc. Even more preferably, the content of the educational message would be closely controlled by asking consumers to diffuse a website address or hotlink that connects subsequent consumers to a site controlled by the manufacturer so as to assure that the appropriate information is communicated. Some typical nonlimiting examples of incentives to the consumer for diffusing information include couponing, reimbursements, opportunities to enter or win contests, entertaining messages, and free software.

iv) Club memberships

Club memberships are an effective and low cost way to stimulate and continually renew interest in wrinkle control products with consumers. Club memberships invite consumers to provide information about themselves such as locations where the consumer can be contacted, places where information and samples can be sent to the consumer, and information about the consumers' background, lifestyles, and preferences, especially as these pertain to product usage. Typically, consumers would be offered incentives to join club programs which could comprise many items including nonlimiting

examples like education, to opportunities to join chat rooms with consumers of similar backgrounds, to free gifts and opportunities to enter contests. The process of joining the club or referring memberships is easy and can be offered in many ways and places with some nonlimiting examples including online, through the mail, with packaging, or where product is sold. Preferably clubs would capture consumer information and use this to improve education programs and product performance and benefits. Preferably the online referral program is structured such that it is not recognized as SPAM by ISP's. Preferably, personal follow-up will occur with consumers so as to build a relationship between consumer and marketer and product rather than remaining limited to building a database.

**5 10 15 20 25 30 35** **b) Television and Cable Marketing**

Television and cable marketing can be surprisingly effective at targeting particular audiences. Cable television in particular provides targeted programming to reach specific consumer groups. Research from groups like Nielsen Media Research provide useful guidance in selecting programming to target specific consumers.

**c) Datacasting**

Datacasting represents combinations of internet and digital broadcasting to provide a combined presentation of both digital and internet marketing as done by Capitol Broadcasting and DTV Plus in Raleigh, NC and Clear Channel in Cincinnati, OH as nonlimiting examples.

**3) Targeting Non Traditional Consumer Segments**

Media directed towards adolescents, men, college students, professionals, etc.

**a) Targeting Electronic Media**

Internet reaches a large group of consumers that are not necessarily accessed by television. Internet tends to be more prevalent and/or more used in higher income homes. Homes that have household members that use the internet surprisingly tend to view less television. Therefore, it is surprisingly effective to advertise and maintain a homepage on the internet for consumers who access internet, since they will not likely be reached by other means. Over 60 million persons in the U.S. use the internet at least once per month and are considered active users.

Also, the content of internet sites can be highly targeted while simultaneous reach a broad selection of the targeted group. Advertising on certain sites can be used to attract various target customers such as the following nonlimiting examples: for college students [www.college-scholarships.com](http://www.college-scholarships.com), and [www.virtualbook.com](http://www.virtualbook.com), for adolescents to young adults, especially, but not limited to males, the Croft Times at [www.ctimes.net](http://www.ctimes.net), for young and adolescent women, [www.fashionTV.com](http://www.fashionTV.com), for busy working parents,

www.signleparentdad.com, www.singleparents.net/sponsors.html, www.normotc.com  
(National Organization Mother's of Twins, Inc.)

**b) Comarketing**

5 Comarketing is a useful way of reaching consumers both in the traditional target audience as well as consumers outside of this target audience. Comarketing can occur with any other marketing entity, virtual as well as non-virtual. Comarketing usually involves multiple business entities working together to make consumers aware of how their products, services, or other offerings can be used together to provide a synergistic benefit for the consumer. Some nonlimiting examples of comarketing programs useful in  
10 the present invention follow. Comarketing could occur with an organization like Tupperware, whereby Tupperware may make an appliance, such as a laundry basket with a special holder for wrinkle spray products and then the wrinkle spray product and the laundry basket could be sold and/or promoted together. Stores, outlets, websites and other distribution sites that offer products and help for designing and organizing the home could provide equipment for enhancing the process of treating clothes and the performance of wrinkle spray could be promoted and/or sold together with the wrinkle spray and organization equipment. A wrinkle composition and iron designed to work together optimally could be promoted and/or sold together. Wrinkle compositions could be promoted in stores that specialize in clothes benefiting from this product such as  
15 Banana Republic, Lerners of New York, Lazarus, Parisian, Elder Berman, Sacs Fifth Avenue, Baby SuperStore, etc. In department stores, and superstores such as Target, Walmart, J.C. Penney, Biggs, Meijer, where clothing is sold as well as consumer products, the wrinkle composition can be stocked both near clothes that can benefit from product use as well in consumer product aisles. Product could be comarketed with  
20 luggage to increase awareness with travelers.  
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**c) Sponsoring Organizations**

30 Sponsoring organizations such as charities, clubs, organizations, and scholarships is a good way to increase product awareness and can be especially useful in targeting particular groups of consumers, since organizations themselves are typically targeted towards particular groups of the population. Some nonlimiting examples of organizations that target particular consumers include the following: for the fashion industry and young professionals, especially women, there are pageant scholarships such as the Miss Texas Scholarship Pageant, Nubian International, Inc., Miss America Scholarship Pageant, Seneca College's Fashion Merchadising and Retail Scholarship (which may also provide opportunities for comarketing since other groups including, but not limited to, The Gap, The Bay, and Tommy Hilfiger sponsor this scholarship). To increase product awareness  
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among young professionals, sponsoring scholarships for professional training are useful and some nonlimiting examples include The U.S. Marine Corp. Scholarship Fund, The Thurgood Marshall Scholarship Fund, Technical Women's Organization Scholarship; and The Actuarial Scholarship Fund. Organizations that can be sponsored and target to the non-traditional handicapped consumer include the following nonlimiting examples: The Special Olympics, Clarinda M. Brueck Handicapped Athletic Fund; Richard Newhope Center; Disability Services, Inc.; American Association for People with Disabilities. Especially busy consumers can be targeted by sponsoring such nonlimiting organizations as The National Organization of Mother of Twins Clubs; Single Parent Support Group (Sponsor's page found at the following website <http://www.singleparents.net/sponsors.html>). General audiences can be targeted with performances, sporting events, and political rallies or gatherings.

**d) Endorsements**

Seeking endorsements especially from organizations that reach the non-traditional consumer of fabric treatment products is a desirable way to increase product awareness. Some nonlimiting examples of preferred groups to target include the elderly (for example through AARP), the physically challenged (for example through the American Association for People with Disabilities), frequent travelers (for example through AAA), and groups advocating child safety.

**4) Targeting Non-Traditional Distribution Channels.**

To make the product very successful it must be widely available. Typically, fabric care goods are directed, marketed and placed in distribution channels directed at the Female-Head-of-Household. In order to increase the the success of the product, it is necessary to make the product available at points-of-sale useful to other consumers as well. Such points-of-sale can be tangible or virtual. Some nonlimiting examples of these points-of sale include: college bookstores, stores and convenience stores immediately surrounding college campuses, and websites directed at college students (Virtualbook.com) which are often frequented by younger adults including single adults; websites, catalogues, and other distribution routes and points-of-sale offering gift boxes for various occasions, e.g. gift boxes for students leaving home to go to school, gift boxes for people new to a neighborhood (welcome wagon), airports (especially shops and lounges) frequented by travelers, specialty stores, magazines, businesses, and websites directed towards travelers, video arcades which are often frequented by adolescents, clothing and specialty stores, magazines, and websites, directed at adolescents (Banana Republic, Champagne International). At sites where equipment for organizing the

household, closets, and laundry room are sold (e.g. Lechters, HomeDepot, Lowe's, The Container Store) which would capture the attention of males as well as females.

**5) Rewards Programs**

5 Rewards programs involve giving the consumer an incentive to initiate or to continue to use the product. Some examples of reward programs include S&H greenpoints and frequent flyer miles. By analogous extension, a program could be initiated for frequent buyers and users of wrinkle control products to reinforce incorporation in daily fabric care habits.

**6) Appropriate Pricing Strategies**

10 There are wrinkle control products that perform satisfactorily in the market today that could provide everyday convenience and freedom from traditional wash process and ironing, but these are not large thriving markets because consumers reserve these for special use, if these are purchased at all. Pricing surprising plays a significant role in converting these high performing products from niche, special occasion use products, to everyday convenience products. Typically to convert the business to a thriving everyday use market, products should be priced such that these are less than about 11.00 USD/ 500 mL of said composition, more preferably less than about 8.00 USD/ 500 mL of said composition, even more preferably less than about 5.00 USD/ 500 mL and most preferably less than about 4.00 USD/ 500 mL of said composition. Alternately, driving the pricing too low surprisingly convinces consumers that the product must be low in active levels and therefore ineffective and so it is preferred to maintain a pricing of greater than about 1.00 USD/ 500 mL of said composition.

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**7) Combinations of Methods for Improving Product Awareness**

25 Combinations thereof of methods for imrpoving product awareness are preferred and highly effective.

**EXAMPLES OF INSTRUCTIONS FOR USE FOR CONSUMERS**

30 The following provides some nonlimiting examples of methods formulated as instructions for use that can be provided as written instructions, video instructions, and/or live or virtual demonstrations to consumers either as part of an article of manufacture comprising a wrinkle control composition or independent of the wrinkle control composition as a method of educating the consumer, disseminating educational elements, and/or raising consumer awareness related to wrinkle control products.

**EXAMPLE 1**

Example 1 teaches the consumer to treat a shirt using a 'hang and spray' methodology. The consumer is instructed in methods as follows. Hang the shirt up (or suspend the shirt in some other way, such as pinning to a clothesline). If desired, a towel can be placed on the floor to catch any composition that falls on the floor, such as over sprays. Also, if desired, the shirt can be hung in the bathroom and sprayed over the tub to catch over spray. If the tub is used to catch over spray, it should be rinsed after use to prevent accidental slipping. Pick up the wrinkle control composition and set the triggering mechanism to the open or on position. Hold the sprayer 8-9 inches from the front of the shirt. Spray the shirt from top to bottom in a sweeping motion using 8-9 full strokes from the wrinkle spray package. Sleeves and collars receive 1-2 full strokes from the wrinkle spray package. The shirt should appear damp, but not wet. Grab the shirt with both hands at the top and at the bottom and gently give a few quick horizontal tugs, preferably at least three, tugging at both sides of the shirt and in the middle. Next grab shirt with both hands at the sides and near the sleeves and gently give a few quick vertical tugs, preferably at least three, tugging at the top of the shirt and moving down to tug in the middle of the shirt and then at the bottom of the shirt. Tug the sleeves to remove any remaining wrinkles. Smooth the collars by sliding between the fingers to press the area. Smooth any areas that remain wrinkled with hands or finger tips.

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**EXAMPLE 2**

Example 2 teaches consumers to smooth wrinkles out of garments or fabrics as these is sit on a surface that is preferably flat and preferably horizontal. Place a towel or other item on the site where the fabric will be sprayed, to catch over spray, if desired. If desired, a towel or other item can also be placed on the floor to catch over spray. Spread the fabric onto the flat surface. Pick up the wrinkle control composition and set the triggering mechanism to the open or on position. Hold the sprayer 8-9 inches from the front of the fabric. Spray the product over the surface using a sweeping motion. Typically, it is useful to start at the top of the fabric and spray across the fabric in a sweeping motion and then gradually move down to the bottom of the fabric. While sweeping across the fabric, one full stroke from the sprayer should be administered at least at about every six inches. The fabric should appear damp but not wet. To smooth, slide hands over the shirt using light pressure. If needed the fabric can be tugged to remove remaining wrinkles. If some wrinkles are not easily removed, spray these sites again, concentrating more of the wrinkle control composition on these sites and tug preferably both perpendicularly to and parallel to the wrinkle. If the fabric has creases

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that are desired to remain in the fabric (e.g. pleats, or the crease in the front of the pants) these can be reinforced by pinching these between the fingers and pulling the fingers along the pleat or crease. Leave the fabric flat or hang to dry.

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### **EXAMPLE 3**

Example 3 is intended to teach consumers to treat household fabrics in their typical environment. After the household fabric is washed or whenever it becomes wrinkled through use, the wrinkle control spray can be used to remove wrinkles while the household fabric remains in its typical environment. This saves the time of removing the 10 household garment from its typical environment and finding someplace else to treat the household fabric that has enough space to make the process convenient. Curtains can be treated while these hang on the wall. First close the curtains. Next set the wrinkle composition sprayer to open or on. Spray composition on the curtains using full strokes. Start at the top and sweep the spray downward spraying at least at each six inch interval 15 and then move horizontally to the next part of the curtain spraying in a sweeping motion up and down the curtain until the entire curtain is treated. Alternately, start at the top of the curtain and spray horizontally across the curtain using a sweeping motion, and spraying with full strokes at least at every six inches and move downward spraying in a sweeping motion across the curtain horizontally while moving downward toward the 20 bottom of the curtain. The curtain should appear damp, but not wet. Pull large wrinkles out of the curtains and allow curtains to hang on rods while these dry. For heavier curtains which require more than about 30% by weight of a wrinkle composition that contains at least about 50% water it may be necessary to remove curtains from rods to treat these as the increased weight when composition. Reasonable care should be 25 exercised to prevent over spray, but if over spray occurs, it should be wiped up after use. If over spray does remain on the surface and dry, it can be removed with water. A similar process of treating household fabrics in their environment can be employed with bed spreads, table clothes, pillowcases, shower curtains, etc. When the surfaces associated with or part of the environment of that is the typical environment of the 30 household fabric are easily damaged by water or liquids (e.g. wood) reasonable care should be exercised to prevent over dampening the household fabrics and thereby dampening the surfaces in the environment of the household fabric.

### **IV. ARTICLE OF MANUFACTURE**

35 The present invention also encompasses articles of manufacture comprising (1) a container having spray dispensing means, (2) a wrinkle control composition, and (3)

optionally, but preferably, information concerning the use of the composition to remove and/or control wrinkles in fabrics. A variety of containers, compositions, and information can be utilized in the present articles of manufacture as described hereinafter.

5 The present articles of manufacture preferably comprise information in the form of a set of instructions that are typically in association with the container. The set of instructions typically communicates to the consumer methods for dispensing the composition in an amount effective to provide a solution to problems involving, and/or provision of a benefit related to, those selected from the group consisting of: killing or reducing the level of, microorganisms; reducing odors; and/or reducing static in addition to the reduction of wrinkles. It is important that the consumer of the present article be aware of these benefits, since otherwise the consumer would not know that the composition would solve these problems or a combination of these problems and/or provide these benefits or a combination of benefits.

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15 As used herein, the phrase "in association with" means the set of instructions are either directly printed on the container itself, packaging for the container or presented in a separate manner including, but not limited to, a brochure, print advertisement, electronic advertisement, and/or broadcast communication, so as to communicate the set of instructions to a consumer of the article of manufacture. The set of instructions preferably comprises the instruction to apply an effective amount of the composition, preferably by spraying, to provide the indicated benefit, e.g., wrinkle reduction, and, optionally, antimicrobial action, and/or anti-static effect, etc. and, also optionally, the provision of odor control and/or reduction and to physically manipulate the fabric to remove existing wrinkles.

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25 A more complete disclosure of the instructions has been provided above.

#### **A. CONTAINERS PROVIDING SPRAY PATTERN**

30 The key parameter effective in minimizing staining and reducing dry time is in achieving a uniform distribution of the liquid composition over the surface area of the fabric. Therefore, containers having spray dispensing means that will provide such a uniform spray distribution are preferred.

35 The uniformity of the distribution is understood to mean the volume of product dispensed per unit of surface area and the standard deviation in the volume deposited per unit of surface area. It is preferred that the spray dispenser selected for use in the methods of the present invention be capable producing an acceptable spray pattern that falls within the limits on volume of product dispensed per unit area and on the standard deviation in volume per unit surface area disclosed herein. Preferred sprayers will

provide a spray pattern with a volume per unit surface area of less than about 0.07 ml/inch<sup>2</sup> (0.011 ml/cm<sup>2</sup>) with a standard deviation in the volume per unit surface area of less than about 0.056 ml/inch<sup>2</sup> (0.0087 ml/cm<sup>2</sup>).

5 Examples of suitable spray dispensers that provide the desired spray pattern that are commercially available include, but are not limited to, the Indesco T-8500 available from Continental Sprayers Inc. and TS-800-2 and TS-800-2E available from Calmar, Inc.

### **B. COMPOSITION**

10 An article of manufacture for use in the methods of the present invention comprise a wrinkle controlling composition according to the compositions described hereinbefore in Section I.

### **C. SET OF INSTRUCTIONS**

15 As discussed hereinbefore, an article of manufacture for use in the methods of the present invention will also comprise information concerning the use of the wrinkle control composition to control wrinkles without the application of heat. It is preferred that the information provided with the composition comprise a set of instructions in association with the container, said instructions concerning the use the composition. The information or instructions informing the consumer that in order to effectively use the composition, the consumer is to apply an amount effective amount of the wrinkle control composition to the fabrics and to physically manipulate the fabrics in order to remove existing wrinkles from the fabrics. Many other instructions may be included in the information provided to the consumer and these have been discussed in greater detail above.

20 25 As used herein, the phrase "in association with" means the set of instructions are either directly printed on the container, packaging for the container or presented with the container in a separate manner including, but not limited to, a brochure, print advertisement, electronic advertisement, and/or verbal communication. The set of instructions preferably comprises the instruction to apply an effective amount of the composition, preferably by spraying, to provide the indicated benefit, e.g. wrinkle reduction, antimicrobial action, static effect, and/or reduction in time and/or effort of ironing and, optionally, the provision of the main effect of odor control and/or reduction.

30 35 The set of instructions of the present articles can comprise the instruction or instructions to achieve the benefits discussed herein by carrying out any of the methods of using wrinkle controlling compositions as described herein.

**EXAMPLE I**

The following are Examples of wrinkle controlling compositions for use with the methods of the present invention:

5

<b>Examples</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 volatile silicone	1.0	0.5	--	--	--
Silwet L-77	2.0	--	0.5	--	--
Silwet L-7657	--	1.0	0.25	--	--
Perfume	0.1	0.05	0.1	0.1	0.05
Distilled Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
Ethanol	15%	-	3%	2%
Isopropanol	-	12%	2%	1%
Perfume	0-0.04%	0-0.04%	0-0.04%	0-0.04%
Water	balance	balance	balance	balance

<b>Compound</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
Ethanol	15%	-	3%	2%
Isopropanol	-	12%	2%	1%
Propellant*	***	***	***	***
Perfume	0-0.04%	0-0.04%	0-0.04%	0-0.04%
Water	balance	balance	balance	balance

\*\* Propellant can be selected from a variety of materials

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<b>Compound</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>17</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
SH3772 <sup>1</sup>	0.2%	-	-	-
SH3748 <sup>1</sup>	-	0.3%	-	-
SH8700 <sup>1</sup>	-	-	0.3%	-
KF354 <sup>2</sup>	-	-	-	0.2%
hexylene glycol	10%	-	-	-
dipropylene glycol	-	5%	-	-
3-methoxybutanol	-	-	5%	-
ethanol	-	-	5%	10%
perfume	0-0.02%	0-0.02%	0-0.02%	0-0.02%
water	balance	balance	balance	balance

1. Silicone-glycol copolymer from Toray Dow Corning Silicone Co., Ltd.

2. Silicone-glycol copolymer from Shin-Etsu Chemical Co. Ltd.

<b>Compound</b>	<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
Silwet® L7602 <sup>3</sup>	0.2	0.3	0.5	1.0%
Isopropanol	5	-	2.5	-
Hexylene glycol	-	5	-	2.5%
Isoprene glycol	-	-	-	2.5%
Hydroxypropyl- $\beta$ -cyclodextrin	-	-	0.5%	
methylated cyclodextrin	-	-	-	0.75%
Perfume	0-0.04	0-0.04%	0-0.04%	0-0.04%
Water	balance	balance	balance	balance

3. Silicone-glycol copolymer from CK-Witco.

<b>Compound</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
K-766 <sup>4</sup>	1.0%	0.8%	0.5%	0.7
EtOH	8.0%	5.0%	5.0%	3.0%
Stepanol WAC <sup>5</sup>	0.5%	0.7%	0.1%	
Neodol 25-9 <sup>6</sup>	0.5%	-	-	1.0%
Neodol 23-3 <sup>7</sup>	-	-	1.0%	-
Perfume	0-0.1%	0-0.1%	0-0.1%	0-0.1%
Water	balance	balance	balance	balance

4. Sodium polymethacrylate from BF Goodrich  
 5. Sodium lauryl sulfate available from stepanol  
 6. alkyl ethoxylate with 12-15 carbons and an average of 9 ethoxylates available from Shell.  
 7. alkyl ethoxylate with 12-13 carbons and an average of 3 ethoxylates available from Shell

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<b>Compound</b>	<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
Dow Corning® 190	0.01%	0.1%	-	-
Surfactant <sup>8</sup>				
Ethanol	20%	10%	10%	20%
3M Fluorad® <sup>9</sup>	-	-	0.01	0.1%
Perfume	0-0.1%	0-0.1%	0-0.1%	0-0.1%
Water	balance	balance	balance	balance

8. Silicone glycol copolymer from Dow Corning.  
 9. Nonionic fluorinated alkyl ester available from 3M.

<b>Compound</b>	<b>29</b>	<b>30</b>	<b>31</b>	<b>32</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
Dow Corning® 190	0.01%	0.1%	-	-
Surfactant <sup>8</sup>				
Ethanol	20%	10%	10%	20%
3M Fluorad® <sup>9</sup>	-	-	0.01	0.1%
Propellant**				
Perfume	0-0.1%	0-0.1%	0-0.1%	0-0.1%
Water	balance	balance	balance	balance

\*\*\* Propellant selected from the following

<b>Compound</b>	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
Dow Corning 190	0.01%	0.1%	-	-
Surfactant				
Ethanol	20%	10%	10%	20%
3M Fluorad	-	-	0.01	0.1%
Hydroxypropyl- $\beta$ -cyclodextrin	0.5%	1.0%		
methylated cyclodextrin	-	-	1.0!	0.75%
Perfume	0-0.1%	0-0.1%	0-0.1%	0-0.1%
Water	balance	balance	balance	balance

<b>Examples</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>	<b>41</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 volatile silicone	1.0	0.5	--	--	--
Silwet L-77	2.0	--	--	--	--
Silwet L-7657	--	1.0	0.5	--	--
Polysorbate 60 <sup>(1)</sup>	--	--	--	0.5	
Perfume	0.1	0.05	0.1	0.1	0.05
Distilled Water	Bal.	Bal.	Bal.	Bal.	Bal.

(1) A mixture of stearate esters of sorbitol and sorbitol anhydride, consisting predominantly of the monoester, condensed with about 20 moles of ethylene oxide.

5

<b>Examples</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 volatile silicone	0.5	0.5	0.5	0.35	1.0	1.0
Silwet L-7602	0.7	--	--	--	--	--
Silwet L-7622	--	0.5	--	0.7	--	0.8
Silwet L-7604	--	--	0.5	--	--	--
Silwet L-7210	--	--	--	0.5	--	--
Silwet L-7001	--	--	--	--	1.0	--
Silwet L-7600	--	--	--	--	--	0.4
Perfume	0.1	0.1	0.05	0.1	0.03	0.05
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

<u>Examples</u>	<u>48</u> Wt%	<u>49</u> Wt%	<u>50</u> Wt%	<u>51</u> Wt%	<u>52</u> Wt%	<u>53</u> Wt%
<u>Ingredients</u>						
Lithium bromide	3.0	--	2.0	1.0	2.5	--
Lithium lactate	--	3.0	--	--	--	2.0
D5 volatile silicone	0.5	--	--	0.25	--	--
Silicone emulsion	--	2.0	--	1.0	--	--
A <sup>(1)</sup>						
Silicone emulsion	--	--	2.0	--	--	--
B <sup>(2)</sup>						
Silwet L-7210	0.5	--	--	--	0.1	--
Silwet L-7602	--	0.1	--	--	0.1	--
Silwet L-7622	--	--	0.1	0.4	--	--
Perfume	0.1	0.03	0.03	0.05	0.03	--
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

5 (1) DC-2-5932 silicone microemulsion (25% active) from Dow Corning, with a particle size of about 24 nm, a cationic surfactant system, and a silicone with an internal phase viscosity of about 1,200 cps.  
 (2) DC-1550 silicone microemulsion (25% active) from Dow Corning, with a particle size of about 50 nm, an anionic/nonionic surfactant system, and a silicone with an internal phase viscosity of about 100,000 cps.

<u>Examples</u>	<u>54</u> Wt%	<u>55</u> Wt%	<u>56</u> Wt%	<u>57</u> Wt%	<u>58</u> Wt%	<u>59</u> Wt%
<u>Ingredients</u>						
Luviset CA 66 <sup>(a)</sup>	0.4	--	--	--	--	--
Luviset CAP <sup>(b)</sup>	--	0.5	--	--	--	--
Sokalan EG 310 <sup>(c)</sup>	--	--	0.4	--	--	--
Ultrahold CA 8 <sup>(d)</sup>	--	--	--	1.0	--	--
Amerhold DR-25 <sup>(e)</sup>	--	--	--	--	0.75	--
Poligen A <sup>(f)</sup>	--	--	--	--	--	0.25
Silwet L-7600	0.15	--	--	--	--	--
Silwet L-7602	--	0.25	--	0.2	0.4	--
Silwet L-7604	--	--	0.2	--	--	0.15
Neodol 23-3	0.1	--	--	0.2	--	--
Diethylene glycol	0.3	--	0.1	0.5	0.2	0.15
Perfume	0.1	0.05	0.03	0.08	0.05	0.05
NaOH/HCl	to pH 9	to pH 9	to pH 8	to pH 8	to pH 7	to pH 7.2
Kathon CG	3 ppm					
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

10 (a) Vinyl acetate/crotonic acid copolymer.  
 (b) Vinyl acetate/vinyl propionate/crotonic acid copolymer.  
 (c) Polyvinylpyrrolidone/acrylic acid copolymer.  
 (d) Ethyl acrylate/ acrylic acid/N-t-butyl acrylamide copolymer.  
 (e) Ethyl acrylate/methacrylic acid/methyl methacrylate/acrylic acid copolymer.  
 (f) Polyacrylate dispersion.

**Examples 60-65**

The shape retention copolymer and the surfactant(s) are added with vigorous mixing into the water seat, which is pre-adjusted to about pH 12 using an aqueous NaOH (30%) solution. As the copolymer is slowing dissolved, NaOH solution is added to maintain the high pH. After about 1 hour of vigorous stirring, the composition is adjusted with HCl to the desired pH. Finally, diethylene glycol, perfume and Kathon preservative are added with agitation.

<b>Examples</b>	<b>60</b>	<b>61</b>	<b>62</b>	<b>63</b>	<b>64</b>	<b>65</b>
<b>Ingredients</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>
Luviset CA 66 <sup>(a)</sup>	0.4	--	--	--	--	--
Luviset CAP <sup>(b)</sup>	--	0.5	--	--	--	--
Sokalan EG 310 <sup>(c)</sup>	--	--	0.4	--	--	--
Ultrahold CA 8 <sup>(d)</sup>	--	--	--	1.0	--	--
Amerhold DR-25 <sup>(e)</sup>	--	--	--	--	0.75	--
Poligen A <sup>(f)</sup>	--	--	--	--	--	0.25
Silwet L-7600	0.15	--	--	--	--	--
Silwet L-7602	--	0.25	--	0.2	0.4	--
Silwet L-7604	--	--	0.2	--	--	0.15
Neodol 23-3	0.1	--	--	0.2	--	--
Diethylene glycol	0.3	--	0.1	0.5	0.2	0.15
Perfume	0.1	0.05	0.03	0.08	0.05	0.05
NaOH/HCl	to pH 9	to pH 9	to pH 8	to pH 8	to pH 7	to pH 7.2
Kathon CG	3 ppm					
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

(a) Vinyl acetate/crotonic acid copolymer.  
 (b) Vinyl acetate/vinyl propionate/crotonic acid copolymer.

(c) Polyvinylpyrrolidone/acrylic acid copolymer.

(d) Ethyl acrylate/ acrylic acid/N-t-butyl acrylamide copolymer.

(e) Ethyl acrylate/methacrylic acid/methyl methacrylate/acrylic acid copolymer.

(f) Polyacrylate dispersion.

<b>Examples</b>	<b>66</b>	<b>67</b>	<b>68</b>	<b>69</b>	<b>70</b>
<b>Ingredients</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>
Copolymer E <sup>(s)</sup>	0.5	0.3	--	--	--
Copolymer F <sup>(t)</sup>	--	--	0.6	0.4	--
Copolymer G <sup>(u)</sup>	--	--	--	--	0.5
Lithium bromide	2.0	--	--	1.0	--
D5 volatile silicone	0.25	--	0.2	--	0.5
PDMS 10,000 cst	--	0.25	--	--	--
Silicone emulsion B	--	--	--	1.0	--
Silwet L-77	0.7	--	0.5	--	1.0
Silwet L-7604	--	0.25	--	0.5	--

<b>Compound</b>	<b>71</b>	<b>72</b>	<b>73</b>	<b>74</b>	<b>75</b>
Luviflex Soft <sup>1</sup>	0.1	0.5	1.0	1.5	3.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel® <sup>2</sup>	0.015	0.015	0.015	0.015	0.015
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

1. Ethylacrylate methacrylate copolymer, average MW = 250,000 from BASF

2. 1,2-benzisothiazoline-3-one available from Zeneca.

<b>Compound</b>	<b>76</b>	<b>77</b>	<b>78</b>	<b>79</b>	<b>80</b>
Luviflex Soft	0.1	0.5	1.0	1.5	3.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel®	0.015	0.015	0.015	0.015	0.015
EtOH	3.0	3.0	4.0	5.0	6.0
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

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<b>Compound</b>	<b>81</b>	<b>82</b>	<b>83</b>	<b>84</b>	<b>85</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001 <sup>3</sup>	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200 <sup>4</sup>	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

3. Pendant copolymer of polydimethylsiloxane and ethylene-oxide/propylene oxide with an average MW = 20,000 and an EO/PO ratio of 60/40 available from CK-Witco.

4. Arabinogalactan polymer available from Larex®, Inc.

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<b>Compound</b>	<b>86</b>	<b>87</b>	<b>88</b>	<b>89</b>	<b>90</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006 <sup>5</sup>	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

5. Aminotri(methylenephosphonic acid) penta sodium salt available from

<b>Compound</b>	<b>91</b>	<b>92</b>	<b>93</b>	<b>94</b>	<b>95</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>96</b>	<b>97</b>	<b>98</b>	<b>99</b>	<b>100</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
methylated cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>101</b>	<b>102</b>	<b>103</b>	<b>104</b>	<b>105</b>
Luviflex Soft	0.3	0.5	0.7	1.5	2.0
Silwet® L7200 <sup>6</sup>	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

6. Pendant copolymer of polydimethylsiloxane and ethylene-oxide/propylene oxide with an average MW = 19,000 and an EO/PO ratio of 25/75 available from CK-Witco.

<b>Compound</b>	<b>106</b>	<b>107</b>	<b>108</b>	<b>109</b>	<b>110</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7200	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
methylated cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compounds</b>	<b>111</b>	<b>112</b>	<b>113</b>	<b>114</b>	<b>115</b>
Diahold ME® <sup>7</sup>	0.1	0.5	1	1.5	3.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel®	0.015	0.015	0.015	0.015	0.015
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

7. This material is a t-butyl acrylate/acrylic acid/ (polydimethylsiloxane macromer, 12,000 approximate molecular weight) (60/20/20), copolymer of average molecular weight of about 128,000 available from Mitsubishi.

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<b>Compound</b>	<b>116</b>	<b>117</b>	<b>118</b>	<b>119</b>	<b>120</b>
Diahold ME®	0.3	0.5	0.7	1.5	2
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>121</b>	<b>122</b>	<b>123</b>	<b>124</b>	<b>125</b>
Diahold ME®	0.3	0.5	0.7	1.5	2
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
methylated cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>126</b>	<b>127</b>	<b>128</b>	<b>129</b>	<b>130</b>
Diahold ME®	0.3	0.5	0.7	1.5	2.0
Silwet® L7200	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>131</b>	<b>132</b>	<b>133</b>	<b>134</b>	<b>135</b>
Diahold ME®	0.3	0.5	0.7	1.5	2.0
Silwet® L7200	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
methylated cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>136</b>	<b>137</b>	<b>138</b>	<b>139</b>	<b>140</b>
Luviflex Soft	0.3	0.5	0.7	1.5	2.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>141</b>	<b>142</b>	<b>143</b>	<b>144</b>	<b>145</b>
Diahold ME®	0.3	0.5	0.7	1.5	2.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>146</b>	<b>147</b>	<b>148</b>	<b>149</b>	<b>150</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001 <sup>3</sup>	0.75	1.5	---	---	0.5
Silwet® L7002	---	---	0.8	1.0	0.5
Silwet® L77	0.5	---	0.5	---	---
Dow Corning Q2-5211	---	0.30	---	0.6	0.5
LaraCare™ A200 <sup>4</sup>	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>151</b>	<b>152</b>	<b>153</b>	<b>154</b>	<b>155</b>
Luviflex Soft	0.3	0.5	0.7	1.5	2
245 Fluid® <sup>8</sup>	2.5	2.5	2.5	2.5	2.5
Silwet® L77 <sup>9</sup>	2.0	2.0	2.0	2.0	2.0
Neodol® 23-31 <sup>10</sup>	0.5	0.5	0.5	0.5	0.5
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.02-0.04	0.02-0.04	0.02-0.04	0.02-0.04	0.02-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

8. Decamethylcyclopentasiloxane available from Dow Corning.

9. Pendant copolymer of polydimethyl siloxane and ethylenoxide with average molecular weight of 600, available from CK-Witco

5 10. Alkyl ethoxylate surfactant with 12-13 carbons and an average of three ethoxylate groups available from Shell

<b>Compound</b>	<b>156</b>	<b>157</b>	<b>158</b>	<b>159</b>	<b>160</b>
Luviflex Soft	0.3	0.5	0.7	1.5	2
Silwet® L77	2.5	-	-	1.0	-
Q2-5211 <sup>11</sup>	-	2.0	-	-	-
190 Surfactant <sup>12</sup>	-	-	1.5	-	-
190 Surfactant <sup>13</sup>	-	-	-	1.0	1.75
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.02-0.04	0.02-0.04	0.02-0.04	0.02-0.04	0.02-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

11. Copolymer of polydimethylsiloxane and alkylene oxide available from Dow Corning®.

12. Copolymer of polydimethylsiloxane and alkylene oxide available from Dow Corning®.

13. Copolymer of polydimethylsiloxane and alkylene oxide available from Dow Corning®.

<b>Compound</b>	<b>161</b>	<b>162</b>	<b>163</b>	<b>164</b>	<b>165</b>
Luviflex Soft	0.1	0.5	1.0	1.5	3.0
TEA Di-ester Quat <sup>14</sup>	0.75	0.5	1.2	1.5	1.5
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel®	0.015	0.015	0.015	0.015	0.015
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

5 14. Fabric softener active derived from the reaction of triethanol amine and fatty acid followed by quaternization with the primary component named N,N-di-(canolyl-oxy-ethyl)-N-methyl-N-(2-hydroxyethyl) ammonium methyl sulfate, available from Goldschmidt.

<b>Compound</b>	<b>166</b>	<b>167</b>	<b>168</b>	<b>169</b>	<b>170</b>
Luviflex Soft	5.0	0.5	6.0	1.5	3.0
TEA Di-ester Quat	1.8	1.0	2.0	1.75	2.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel®	0.015	0.015	0.015	0.015	0.015
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>171</b>	<b>172</b>	<b>173</b>	<b>174</b>	<b>175</b>
Luviflex Soft	0.1	0.5	1.0	1.5	3.0
DEEDMAC <sup>15</sup>	0.75	0.5	1.2	1.5	1.5
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel®	0.015	0.015	0.015	0.015	0.015
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

15. Diallylwoyl Ethanol Ester Dimethyl Ammonium Chloride, available from Goldschmidt.

<b>Compound</b>	<b>176</b>	<b>177</b>	<b>178</b>	<b>179</b>	<b>180</b>
Luviflex Soft	5.0	0.5	6.0	1.5	3.0
DEEDMAC	1.8	1.0	2.0	1.75	2.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel®	0.015	0.015	0.015	0.015	0.015
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>181</b>	<b>182</b>	<b>183</b>	<b>184</b>	<b>185</b>
Luviflex Soft	-	0.7	0.5	0.5	0.7
BC15-H	0.7	-	0.5	0.5	-
2-1084 Emulsion® <sup>16</sup>	1.0	1.0	0.75	0.75	1.2
SM2128 <sup>17</sup>					
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel®	0.015	0.015	0.015	0.015	0.015
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

5 16. Decamethyl cyclopentasiloxane emulsified with N-soyalkyl-2,2"iminobiehtyanol and ethoxylated octadecanamine available from Dow Corning®.

17. Dimethyl siloxane emulsified with a nonionic emulsifier available from GE Silicones

<b>Compound</b>	<b>186</b>	<b>187</b>	<b>188</b>	<b>189</b>	<b>190</b>
Luviflex Soft	-	0.7	0.5	0.5	0.7
BC15-H	0.7	-	0.5	0.5	-
2-1084 Emulsion® <sup>16</sup>	1.0	1.0	0.75	0.75	1.2
SM2128 <sup>17</sup>					
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Proxel®	0.015	0.015	0.015	0.015	0.015
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>191</b>	<b>192</b>	<b>193</b>	<b>194</b>	<b>195</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200 <sup>4</sup>	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>196</b>	<b>197</b>	<b>198</b>	<b>199</b>	<b>200</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl-β-Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>201</b>	<b>202</b>	<b>203</b>	<b>204</b>	<b>205</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>206</b>	<b>207</b>	<b>208</b>	<b>209</b>	<b>210</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>211</b>	<b>212</b>	<b>213</b>	<b>214</b>	<b>215</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>216</b>	<b>217</b>	<b>218</b>	<b>219</b>	<b>220</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>221</b>	<b>222</b>	<b>223</b>	<b>224</b>	<b>225</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>225</b>	<b>226</b>	<b>227</b>	<b>228</b>	<b>229</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>230</b>	<b>231</b>	<b>232</b>	<b>233</b>	<b>234</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>235</b>	<b>236</b>	<b>237</b>	<b>238</b>	<b>239</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>240</b>	<b>241</b>	<b>242</b>	<b>243</b>	<b>244</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>245</b>	<b>246</b>	<b>247</b>	<b>248</b>	<b>249</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>250</b>	<b>251</b>	<b>252</b>	<b>253</b>	<b>254</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>255</b>	<b>256</b>	<b>257</b>	<b>258</b>	<b>259</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>260</b>	<b>261</b>	<b>262</b>	<b>263</b>	<b>264</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>265</b>	<b>266</b>	<b>267</b>	<b>268</b>	<b>269</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
LaraCare™ A200	0.5	0.5	0.5	0.5	0.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>270</b>	<b>271</b>	<b>272</b>	<b>273</b>	<b>274</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.
<b>Compound</b>	<b>275</b>	<b>276</b>	<b>277</b>	<b>278</b>	<b>279</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7001	1.5	1.5	1.5	1.5	1.5
methylated cyclodextrin	0.6	0.3	0.3	0.4	0.8
Ethanol	3.0	3.0	3.0	3.0	3.0
Dequest® 2006	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12	0.02-0.12
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5	5.5-6.5
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>280</b>	<b>281</b>	<b>282</b>	<b>283</b>	<b>284</b>
Luviflex Soft	0.3	0.5	0.7	1.5	2.0
Silwet® L7200	1.5	1.5	1.5	1.5	1.5
Hydroxypropyl- $\beta$ -Cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>285</b>	<b>286</b>	<b>287</b>	<b>288</b>	<b>289</b>
Luviflex Soft	0.3	0.5	0.7	1.5	3.0
Silwet® L7200	1.5	1.5	1.5	1.5	1.5
methylated cyclodextrin	0.3	0.3	0.3	0.3	0.3
Ethanol	3.0	3.0	3.0	3.0	3.0
Proxel®	0.015	0.015	0.015	0.015	0.015
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>290</b>	<b>291</b>	<b>292</b>	<b>293</b>	<b>294</b>
Luviflex Soft	0.5	0.5	0.5	1.5	2.0
DEEDMAC	0.7	1.0	2.0	1.75	2.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
EtOH	20	3	15	15	20
3M Fluorad®	0.005	0.01	0.01	0.015	0.02
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

Fluorad is a nonionic fluorinated alkyl ester available from 3M

<b>Compound</b>	<b>295</b>	<b>296</b>	<b>297</b>	<b>298</b>	<b>299</b>
Luviflex Soft	0.5	0.5	0.1	0.2	3.0
TEA Di-ester Quat	1.8	1.0	2.0	1.75	2.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
3M Fluorad®	0.005	0.015	0.01	0.005	0.02
EtOH	20	10	15	10	20
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Compound</b>	<b>300</b>	<b>301</b>	<b>302</b>	<b>303</b>	<b>304</b>
Luviflex Soft	0.5	0.5	0.5	1.5	2.0
DEEDMAC	0.7	1.0	2.0	1.75	2.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
EtOH	20	3	15	15	20
Dow Corning® 190	0.005	0.01	0.01	0.015	0.02
pH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

Fluorad is a nonionic fluorinated alkyl ester available from 3M

<b>Compound</b>	<b>305</b>	<b>306</b>	<b>307</b>	<b>308</b>	<b>309</b>
Luviflex Soft	0.5	0.5	0.1	0.2	3.0
TEA Di-ester Quat	1.8	1.0	2.0	1.75	2.0
Perfume	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04	0.01-0.04
Dow Corning® 190	0.005	0.015	0.01	0.005	0.02
EtOH	20	10	15	10	20
PH	5-6	5-6	5-6	5-6	5-6
Water	Bal.	Bal.	Bal.	Bal.	Bal.

<u>Examples</u> <sup>(q)</sup>	<u>310</u>	<u>311</u>	<u>312</u>	<u>313</u>	<u>314</u>	<u>315</u>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 Volatile Silicone	2.5	2.0	1.5	1.0	0.75	0.5
Neodol® 23-3	0.5	0.5	0.5	0.5	0.5	0.5
Silwet® L77	2.0	2.0	1.0	1.0	1.0	1.0
C45 AS <sup>(s)</sup>	0.1	0.1	0.1	0.1	0.1	0.1
Perfume	0.02-0.03	0.02-0.03	0.02-0.03	0.02-0.03	0.02-0.03	0.02-0.03
NaOH + HCl	to pH 8					
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

<u>Examples</u> <sup>(q)</sup>	<u>316</u>	<u>317</u>	<u>318</u>	<u>319</u>	<u>320</u>	<u>321</u>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 Volatile Silicone	2.5	2.0	1.5	1.0	0.75	0.5
Neodol® 23-3	0.5	0.5	0.5	0.5	0.5	0.5
Silwet® L77	2.0	2.0	1.0	1.0	1.0	1.0
C45 AS <sup>(s)</sup>	0.1	0.1	0.1	0.1	0.1	0.1
Perfume	0.02-0.03	0.02-0.03	0.02-0.03	0.02-0.03	0.02-0.03	0.02-0.03
NaOH + HCl	to pH 8					
Kathon®	0.003	0.0003	0.003	0.003	0.003	0.003
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

<u>Examples</u> <sup>(q)</sup>	<u>322</u>	<u>323</u>	<u>324</u>	<u>325</u>	<u>326</u>	<u>327</u>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 Volatile Silicone	2.5	2.0	1.5	1.0	0.75	0.5
Neodol® 23-3	0.5	0.5	0.5	0.5	0.5	0.5
Silwet® L77	2.0	2.0	1.0	1.0	1.0	1.0
Stepanol® WAC <sup>(t)</sup>	0.1	0.1	0.1	0.1	0.1	0.1
Perfume	0.025	0.025	0.025	0.025	0.025	0.025
NaOH + HCl	to pH 8					
Kathon	0.003	0.0003	0.003	0.003	0.003	0.003
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

<u>Examples</u> <sup>(q)</sup>	<u>328</u>	<u>329</u>	<u>330</u>	<u>331</u>	<u>332</u>	<u>333</u>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 Volatile Silicone	2.0	2.0	2.0	1.0	0.5	0.5
Neodol® 23-3	0.75	0.25	1.0	0.25	0.5	0.25
Silwet® L77	1.25	2.25	1.0	1.25	0.5	0.5
C45 AS <sup>(s)</sup>	0.1	0.2	0.1	0.1	0.1	0.1
Perfume	0.025	0.025	0.025	0.025	0.025	0.025
NaOH + HCl	to pH 8					
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Examples<sup>(q)</sup></b>	<b><u>334</u></b>	<b><u>335</u></b>	<b><u>336</u></b>	<b><u>337</u></b>	<b><u>338</u></b>	<b><u>339</u></b>	<b><u>340</u></b>	<b><u>341</u></b>
<b>Ingredients</b>	<b>Wt%</b>							
D5 Volatile	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Silicone								
Neodol 23-3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Silwet® L77	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Stepanol®	0.1	0.2	0.1	0.2	-	-	-	-
WAC <sup>(t)</sup>								
Biosoft® D-40 <sup>(u)</sup>	-	-	-		0.1	0.2	0.1	0.2
Perfume	0.025	0.03	0.025	0.03	0.03	0.025	0.03	0.025
NaOH + HCl	-	to pH9	-	to pH8	-	to pH8	-	to pH8
TEA + HCl	to pH8	-	to pH9	-	to pH9	-	to pH9	-
Distilled water	Bal.							
<b>Examples<sup>(q)</sup></b>	<b><u>342</u></b>	<b><u>343</u></b>	<b><u>344</u></b>	<b><u>345</u></b>	<b><u>346</u></b>	<b><u>347</u></b>	<b><u>348</u></b>	<b><u>349</u></b>
<b>Ingredients</b>	<b>Wt%</b>							
D5 Volatile	2.5	2.5	2.0	2.0	2.5	2.5	1.5	2.5
Silicone								
Neodol® 23-3	0.5	0.5	0.5	0.5	-	-	-	-
Neodol® 23-2					0.5	0.5	0.25	0.5
Silwet® L77	-	-	0.75	-	1.75	-	-	-
Silwet® L7280	2.0	-	0.75	0.5	-	1.75	1.0	-
Silwet® L7608	-	2.0	-	1.0	-	-	-	1.0
Silwet® L7600	-	-	-	-	0.25	-	-	0.25
Silwet® L7607	-	-	-	-	-	0.25	0.25	-
Stepanol®	0.1	0.2	0.1	0.2	0.1	0.2	-	0.1
WAC <sup>(t)</sup>								
Perfume	0.02	0.03	0.02	0.03	0.03	0.025	0.01	0.015
NaOH + HCl	to pH9	to pH8	to pH8	to pH8	to pH9	to pH9	to pH9	to pH8
Distilled water	Bal.							
<b>Examples<sup>(q)</sup></b>	<b><u>350</u></b>	<b><u>355</u></b>	<b><u>356</u></b>	<b><u>357</u></b>	<b><u>358</u></b>	<b><u>359</u></b>		
<b>Ingredients</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>		
D5 Volatile Silicone	2.5	2.0	1.5	1.0	0.75	0.5		
Neodol® 23-3	0.7	0.6	0.5	0.5	0.5	0.3		
Silwet® L77	2.2	2.2	1.25	1.25	1.1	1.1		
Perfume	0.025	0.025	0.025	0.025	0.025	0.025		
NaOH + HCl	to pH 8							
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.		

<b>Examples<sup>(q)</sup></b>	<b><u>360</u></b>	<b><u>361</u></b>	<b><u>362</u></b>	<b><u>363</u></b>	<b><u>364</u></b>	<b><u>365</u></b>
<b>Ingredients</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>
D5 Volatile Silicone	2.5	2.0	1.5	1.0	0.75	0.5
Neodol® 23-3	0.7	0.6	0.5	0.5	0.5	0.3
Silwet® L77	2.2	2.2	1.25	1.25	1.1	1.1
Perfume	0.025	0.025	0.025	0.025	0.025	0.025
NaOH + HCl	to pH 8					
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

(s) A sodium alkyl sulfate made from C<sub>14</sub> and C<sub>15</sub> chain length alcohols.

(t) Sodium lauryl sulfate.

(u) Sodium dodecyl benzene sulfonate.

## 5 Examples VIII

<b>Examples<sup>(q)</sup></b>	<b><u>366</u></b>	<b><u>367</u></b>	<b><u>368</u></b>	<b><u>369</u></b>	<b><u>370</u></b>	<b><u>380</u></b>
<b>Ingredients</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>
D5 Volatile Silicone	2.5	2.5	2.5	2.5	0.5	0.5
Neodol® 23-3	0.5	0.5	1.5	1.5	1.0	1.0
Silwet® L77	2.0	2.0	2.0	1.25	1.0	1.0
Perfume	0.025	0.025	0.025	0.025	0.025	0.025
Diahold® ME <sup>(u)</sup>	0.5	1.0	0.5	1.0	0.5	1.0
NaOH + HCl	to pH 8	to pH 9	to pH 8	to pH 9	to pH 8	to pH 9
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

<b>Examples<sup>(q)</sup></b>	<b><u>381</u></b>	<b><u>382</u></b>	<b><u>383</u></b>	<b><u>384</u></b>	<b><u>385</u></b>	<b><u>386</u></b>
<b>Ingredients</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>	<b>Wt%</b>
D5 Volatile Silicone	2.0	2.0	1.5	1.0	1.0	0.75
Neodol® 23-3	1.0	1.0	0.5	0.5	0.5	0.3
Silwet® L77	2.0	2.0	1.7	1.25	1.5	1.1
Perfume	0.025	0.025	0.03	0.025	0.025	0.025
Diahold® ME <sup>(v)</sup>	0.25	0.5	1.0	1.0	1.5	1.5
NaOH + HCl	to pH 8	to pH 8	to pH 9	to pH 9	to pH 9	to pH 9
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

(v) Acrylic acid/tert-butyl acrylate copolymer in which a number of the acrylic acid units have been modified with polydimethylsiloxane (PDMS). The ratio of t-butyl acrylate to acrylic acid to PDMS modified acrylic acid units in the polymer is approximately 3.1:1 with the number of PDMS repeat units being approximately 100 per polymer.

**Examples IX**

<b>Examples<sup>(q)</sup></b>	<b>388</b>	<b>389</b>	<b>390</b>	<b>391</b>	<b>392</b>	<b>393</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 Volatile Silicone	2.5	2.0	1.5	1.0	0.75	0.5
Neodol® 23-3	0.5	0.5	0.5	0.5	0.5	0.5
Silwet® L77	2.0	2.0	1.0	1.0	1.0	1.0
Stepanol® WAC <sup>(t)</sup>	0.1	0.1	0.1	0.1	0.1	0.1
TEA Di-ester Quat <sup>(w)</sup>	0.2	0.3	0.5	0.7	1.0	1.25
Perfume	0.025	0.025	0.025	0.025	0.025	0.025
NaOH + HCl	to pH 8					
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.

(w) Di(acyloxyethyl)(2-hydroxyethyl)methyl ammonium methyl sulfate where the acyl group is derived from partially hydrogenated canola fatty acid.

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<b>Examples<sup>(q)</sup></b>	<b>393</b>	<b>394</b>	<b>395</b>	<b>396</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
D5 Volatile Silicone	2.0	2.0	2.0	2.0
Neodol® 23-3	0.5	0.5	0.5	0.5
Silwet® L77	2.0	2.0	2.0	2.0
Stepanol® WAC <sup>(t)</sup>	0.1	0.1	0.1	0.1
DEA Di-ester Quat <sup>(x)</sup>	0.2	0.5	-	-
DEEDMAC® <sup>(y)</sup>	-	-	0.2	0.5
Perfume	0.025	0.025	0.025	0.025
NaOH + HCl	to pH 8	to pH 8	to pH 8	to pH 8
Kathon	0.003	0.0003	0.003	0.003
Distilled water	Bal.	Bal.	Bal.	Bal.

(x) Di(acyloxyethyl) dimethyl ammonium methyl sulfate where the acyl group is derived from partially hydrogenated canola fatty acid

(y) Ditallowoyl Ethanol Ester Dimethyl Ammonium Chloride.

<b>Examples<sup>(q)</sup></b>	<b>397</b>	<b>398</b>	<b>399</b>	<b>400</b>	<b>401</b>	<b>402</b>
<u>Ingredients</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>	<u>Wt%</u>
Starch						
Silwet L7001	0.5	0.5	0.5	0.5	0.5	0.5
Silwet® L77	2.0	2.0	1.0	1.0	1.0	1.0
	0.1	0.1	0.1	0.1	0.1	0.1
TEA Di-ester Quat <sup>(w)</sup>	0.2	0.3	0.5	0.7	1.0	1.25
Perfume	0.025	0.025	0.025	0.025	0.025	0.025
NaOH + HCl	to pH 8					
Distilled water	Bal.	Bal.	Bal.	Bal.	Bal.	Bal.